

**Supplemental  
Draft Environmental Impact Statement**

of the

**Proposed  
Shoreline Management Program**

**APPENDIX C**

**Cumulative Impact Analysis**

June, 2010



## SUMMARY OF FINDINGS

In 1972, the state of Washington adopted the Shoreline Management Act (SMA) for the purpose of preventing “the inherent harm in an uncoordinated and piecemeal development of the state’s shorelines” (RCW 90.58.020). The legislature authorized local governments to plan and regulate activities within the state’s shorelines with the oversight of the state Department of Ecology (DOE). State law authorized DOE to develop guidelines for the creation of these shoreline management plans. In 2003, the state of Washington adopted new guidelines for the content of local Shoreline Master Programs (SMPs). The new guidelines require that local jurisdictions conduct a cumulative impact analysis (CIA) addressing:

- Current circumstances affecting the shorelines and relevant natural processes;
- Reasonably foreseeable future development and use of the shoreline; and
- Beneficial effects of any established regulatory programs under other local, state, and federal laws. (WAC 173-26-186)

### ***Current Circumstances***

The ecological conditions along Snohomish County’s shorelines were assessed in an inventory conducted in 2004 – 2006. Results were published in a document entitled, *Summary of Shoreline Ecological Functions and Conditions in Snohomish County*. While many of Snohomish County’s shorelines are in good ecological condition, some shoreline functions have been impacted by development and modifications. Shoreline armoring and flood protection structures have altered natural sedimentation and hydrologic processes along much of the marine, lake and river shorelines in the western half of the County. These shoreline modifications are necessary to protect existing development and land use activities.

The predominant types of land uses in shoreline areas includes: residential and accessory structures, agricultural activities, forestry, public access and recreation, and transportation corridors for rail and auto traffic. In the past, many shorelines were segmented into small residential and recreation lots. Shoreline functions are impacted by such development due to the addition of impervious surfaces, removal of shoreline vegetation, physical modifications of shorelines and wetlands (bulkheads, docks and fill), and reliance on on-site sewage disposal and treatment in the rural areas.

### ***Reasonably Foreseeable Future Development***

Future development is expected to follow the trends of the past –new development along shorelines will continue to include residential, resource and recreation uses. Future shoreline modifications are expected to include bank stabilization, flood protection, docks, restoration projects, parks and public access.

In this CIA, the County has developed a forecast model to estimate the magnitude and location of these types of future development for a planning period from 2007 until 2025. The model predicts the number of new primary structures resulting both from infill on vacant land and new lot creation accomplished through land subdivision. Impervious surface and vegetation clearing associated with these new primary structures is also calculated as is an estimate of the number of new docks and parcels where new shoreline armoring may be needed to protect existing structures. The development potential is then assigned a rank of “high” (20 or more new primary structures), “moderate” (2 to 19

new primary structures) or “low” (1 or fewer new primary structures). Results are reported by water type (lake, marine, river) and by shoreline environment designation in the proposed Shoreline Management Program (SMP).

- Marine shorelines are at highest risk of potential impacts. Of the three waterbody types, Marine shorelines ranked “high” or “moderate” have the highest overall potential density of new development, with an average of one new primary structure for every 8 acres. In contrast, average potential development in the “high” or “moderate” ranked lake reaches would be only one new structure for every 11.5 acres of shoreline and similarly ranked river reaches would be only one new structure for every 47.6 acres of shoreline.
- Under the proposed SMP, the Rural Conservancy shoreline environment is forecast to have the greatest number of new primary structures, however, because the area is so large, development intensity would remain low at 1 new primary structure per 27 acres. The Urban shoreline environment is expected to see a significant number of new primary structures but the ecological processes have already been impacted by existing development at urban intensities. The Urban Conservancy shoreline areas are expected to have the greatest potential for adverse impacts on shoreline ecological functions. These areas currently have largely intact ecological systems but are expected to experience “high” levels of future development. These Urban Conservancy Areas include:
  - Lake Stickney
  - Sultan River – lower reach
  - SF Stillaguamish near Arlington
  - Little Pilchuck Creek east of Lake Stevens
  - Quilceda Creek in the Marysville Urban Growth Area
- The forecast model predicts growth in new primary structures but does not address impacts associated with job growth. The CIA also looked at data associated with the County’s annual growth monitoring efforts for Urban Growth Areas to identify locations that the forecast model may have mischaracterized. Impacts associated with job growth are expected in the following areas:
  - Snohomish River estuary west of I-5 north of Everett
  - Little Bear Creek
  - Stillaguamish River estuary near Stanwood
  - Church Creek
  - Little Pilchuck Creek east of Lake Stevens

The shoreline areas receiving a “high” ranking are summarized in the table below. “N/a” is used in the table where data is not available for a particular shoreline segment. The Reach ID corresponds to the complete data contained in Section 5.0 of this CIA and includes a description of the reach location. The CIA ranking results are shown on the following map.

Shorelines Ranked "High" for Potential Development Impacts				Forecast of Potential Development Impacts 2007-2025					Development Intensity	
Reach ID	Water Type	Water Name	Shoreline Environment Designation	New Primary Structures	New Impervious Surface (acres)	New Vegetation Clearing (acres)	Parcels with New Armoring	New Docks	Parcels per acre ... Before	... After
67	Marine	Point Wells	Urban	323	23.39	29.71	0	n/a	0.018	5.693
51	River	Sultan River/ Marsh Creek	Urban	109	7.87	10.00	24	n/a	0.411	0.984
25	River	SF Stillaguamish	Rural Conservancy	104	7.53	9.56	40	n/a	0.243	0.294
50	River	SF Skykomish	Rural Conservancy	104	7.53	9.56	23	n/a	0.737	1.107
26	River	Canyon Creek	Rural Conservancy	103	7.46	9.48	28	n/a	0.615	0.795
52	River	Woods Creek	Rural Conservancy	99	7.13	9.05	16	n/a	0.076	0.127
55	River	Pilchuck River/ Little Pilchuck Creek	Rural Conservancy	89	6.42	8.15	27	n/a	0.106	0.141
22	River	SF Stillaguamish	Urban Conservancy	79	5.74	7.29	1	n/a	0.006	0.522
61	River	Swamp Creek	Urban	79	5.71	7.25	47	n/a	1.027	1.556
56	River	Pilchuck River	Rural Conservancy	75	5.44	6.91	20	n/a	0.115	0.160
27	River	SF Stillaguamish	Rural Conservancy	74	5.37	6.82	17	n/a	0.104	0.147
58	River	Sauk	Rural Conservancy	71	5.12	6.50	16	n/a	0.041	0.076
65	Marine	Hat Island	Rural Conservancy	70	5.03	6.39	4	n/a	0.743	1.057
62	Marine	Skagit Bay	Urban	66	4.79	6.09	1	n/a	0.016	1.103
55	River	Pilchuck River/ Little Pilchuck Creek	Urban	58	4.18	5.31	13	n/a	0.221	0.894
64	Marine	Tulalip	Rural Conservancy	54	3.88	4.93	5	n/a	0.709	0.800
36	River	Skykomish/Wallace/ Elwell/McCoy	Resource	52	3.78	4.79	6	n/a	0.033	0.048
103	Lake	Stickney	Urban Conservancy	49	3.58	4.54	n/a	7	0.186	1.336
53	River	WF Woods Creek /Carpenter Creek	Rural Conservancy	48	3.48	4.42	11	n/a	0.043	0.066
30	River	Snohomish	Resource	45	3.27	4.16	0	n/a	0.019	0.027
4	River	Pilchuck Creek	Rural Conservancy	43	3.08	3.91	5	n/a	0.045	0.081
16	River	NF Stillaguamish	Rural Conservancy	42	3.01	3.82	12	n/a	0.126	0.166
51	River	Sultan River/ Marsh Creek	Urban Conservancy	42 *	3.00	3.82	23	n/a	0.336	0.685
23	River	Jim Creek	Rural Conservancy	41	2.93	3.72	11	n/a	0.050	0.072
2	River	Stillaguamish River / Upper Portage Creek	Urban Conservancy	41	2.93	3.72	0	n/a	0.051	0.737
54	River	Pilchuck River/ Dubuque	Rural Conservancy	38	2.71	3.45	11	n/a	0.136	0.166
63	Marine	Port Susan	Rural Conservancy	37	2.71	3.44	3	n/a	0.568	0.628
13	River	NF Stillaguamish	Rural Conservancy	37	2.71	3.44	5	n/a	0.067	0.105
29	River	Quilceda Creek	Urban Conservancy	37	2.66	3.38	86	n/a	1.036	1.305
103	Lake	Stickney	Urban	37	2.66	3.38	n/a	15	1.314	2.366
49	River	Skykomish/NF Sky./ Deer Creek	Rural Conservancy	34	2.49	3.16	11	n/a	0.110	0.149
98	Lake	Roesiger	Rural Conservancy	34	2.47	3.14	n/a	7	1.656	1.790
102	Lake	Stevens	Urban	32	2.28	2.90	n/a	34	1.885	2.214
3	River	Church Creek	Urban	31	2.24	2.85	1	n/a	0.037	0.612
1	River	Stillaguamish River / Lower Portage Creek	Resource	23	1.67	2.12	6	n/a	0.026	0.029
45	River	Skykomish	Rural Conservancy	23	1.67	2.12	13	n/a	0.254	0.287
54	River	Pilchuck River/ Dubuque	Resource	23	1.65	2.09	9	n/a	0.283	0.316
40	River	Wallace/Bear/May	Rural Conservancy	22	1.57	1.99	4	n/a	0.145	0.186



# Cumulative Impact Analysis

DECEMBER 2009

The Cumulative Impact Ranking criteria are based upon the forecast model of new primary structures

## Cumulative Impact Ranking by Planning Segment

### Forecast of New Primary Structures

- High - Greater than or equal to 20 Structures
- Moderate - From 2 thru 19 Structures
- Low - Less than or equal to 2 Structures

102 Planning Segment Number  
(Please refer to Section 5.0  
Cumulative Impact Analysis -  
Shoreline Management Program)

- Shoreline Management Program Jurisdictions
- Urban Growth Area Boundary
- Incorporated City Boundary
- Railway
- Major Arterial Roadway
- Arterial Roadway

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Parcel lines and designation boundaries are updated to the Snohomish County Assessor's Integrated Land Records Parcel Data Base as of June 2009.

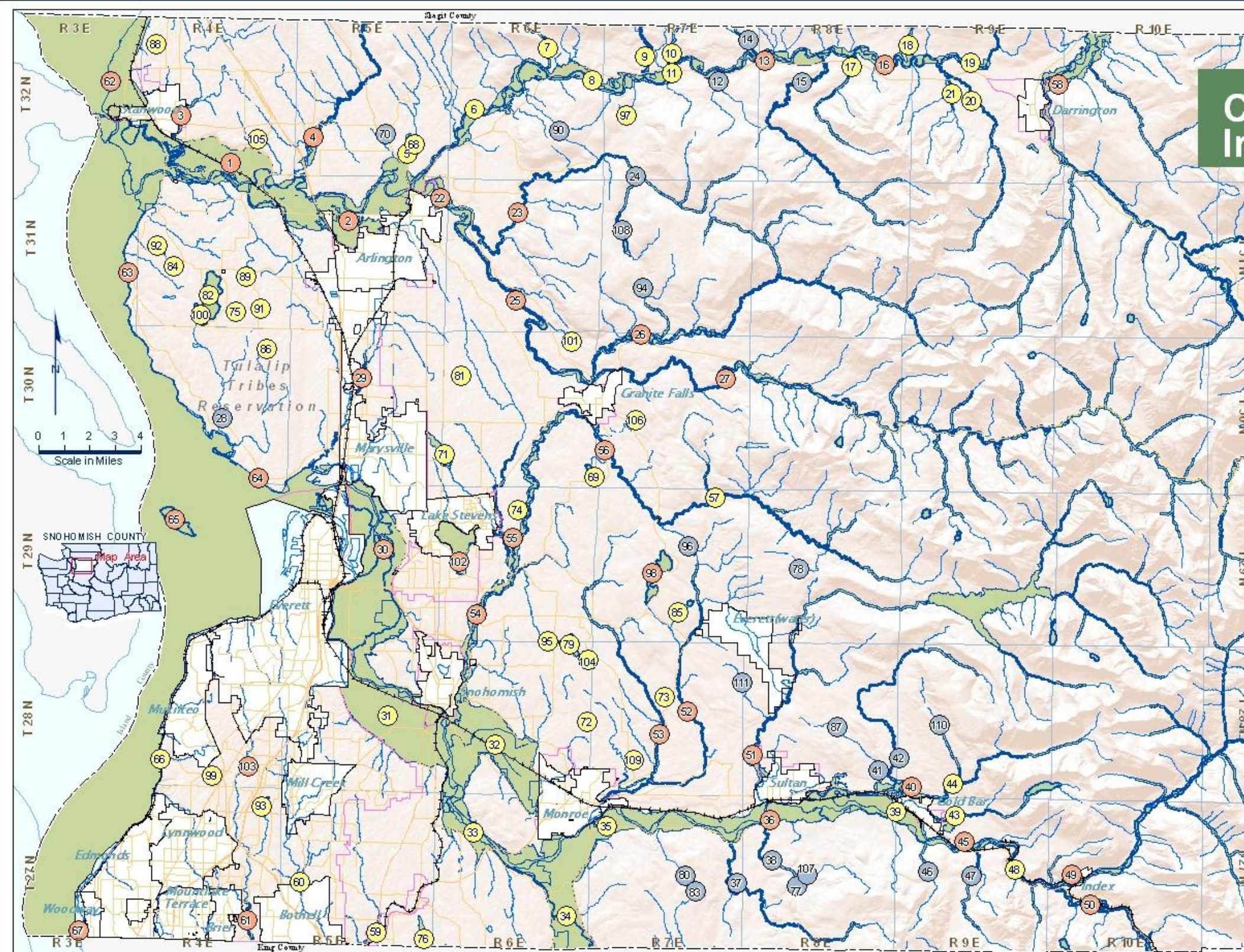
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For the purposes of land use planning review, final designations of future land use designations will be made by the County during the review process.

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### ***Beneficial Effects of Any Established Regulatory Programs***

The proposed SMP contains policies and regulations designed to protect shoreline ecological functions while allowing use of the shorelines consistent with the goals of the SMA. These SMP provisions will help offset potential impacts related to development activities. Some provisions are applied to all shoreline jurisdiction countywide while others are applied to specific shoreline environment designations. The shoreline environment designations are assigned in part based on the ecological conditions present. The environment-specific policies and regulations then reflect the level of ecological sensitivity – the higher value and the more sensitive the ecological conditions, the more restrictive are the policies and regulations within that environment. The Aquatic, Natural and Urban Conservancy designations under the proposed SMP are the most restrictive shoreline environments.

To promote the goals of the SMA and offset potential impacts from development, the proposed SMP contains policies and regulations addressing the following:

- Preference for water-dependent uses, single-family residential uses, public access and recreation, and recreation;
- Shoreline environment-specific use limitations, design standards and vegetation retention requirements;
- Requirement to avoid, minimize and mitigate impacts to achieve a “no net loss” standard for shoreline ecological functions;
- Critical area protection requirements including preservation of riparian buffers; structural setbacks; development restrictions in channel migration zones, steep slopes and flood hazard areas; and wetland and habitat protection.
- Limitations of structural bank stabilization and flood protection measures; and
- Encouraging shoreline ecological restoration.

### ***Conclusions***

The County has adopted a multifaceted approach to protect shoreline ecological functions. This approach includes both regulatory and non-regulatory programs. The new guidelines adopted by the state in 2003 support this approach, acknowledging that the policy goals of the SMA may not be achievable by development regulations alone (WAC 173-26-186). The County’s multifaceted approach includes planning; intergovernmental coordination; development of regulation; enforcement; and improved protection of ecological functions and values through non-regulatory incentive-based means, such as voluntary enhancement and restoration, public education and other voluntary activity; and monitoring and adaptive management.

Based on the types of foreseeable development that are likely to occur within Snohomish County shorelines and the existing components of the proposed SMP combined with the County’s multifaceted approach, it appears that potential impacts to shoreline function will be adequately addressed. When the regulatory and non-regulatory programs are utilized together, the County should be able to achieve the “no net loss” standard for shoreline ecological functions.





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## List of Acronyms

BMP	Best Management Practices
CAR	Critical area regulations
CFS	Cubic Feet Per Second
CMZ	Channel Migration Zone
CUP	Conditional use permit
DOE	Washington State Department of Ecology
DNR	Washington State Department of Natural Resources
FEMA	Federal Emergency Management Agency
GIS	Geographic Information Systems
MWU	Municipal Watershed Utility (proposed SMP shoreline environment designation)
OHW	Ordinary High Water Mark
PUD	Public Utility District
RCW	Revised Code of Washington
SCC	Snohomish County Code
SEIS	Supplemental Environmental Impact Statement
SEPA	State Environmental Policy Act
SMA	Shoreline Management Act
SMMP	Shoreline Management Master Program (known herein as the existing SMMP)
SMP	Shoreline Management Program (known herein as the proposed SMP)
UGA	Urban Growth Area
WAC	Washington Administrative Code
WSDFW	Washington State Department of Fish & Wildlife



## 1.0 INTRODUCTION

In 1972, the state of Washington adopted the Shoreline Management Act (SMA) for the purpose of preventing “the inherent harm in an uncoordinated and piecemeal development of the state’s shorelines” (RCW 90.58.020). In adopting this program, the legislature acknowledged the need to balance various interests in the shorelines of the state. Key goals of the SMA address preservation of state shorelines for water-dependent economic uses, public access and recreation, and protection of shoreline ecological functions. The legislature authorized local governments to plan and regulate activities within the state’s shorelines with the oversight of the state Department of Ecology (DOE). State law authorized DOE to develop guidelines for the creation of these shoreline management plans.

Snohomish County adopted its first shoreline master program in 1974, called the Shoreline Management Master Program (SMMP). Since then, the County has made several revisions to the program. However, the County has not conducted a comprehensive update to that program since its original adoption. In 2003, the state of Washington adopted new requirements for the contents of Shoreline Master Programs (SMPs) to be administered by local governments.

Starting in January 2004, Snohomish County began the process of amending its existing SMP. The County process involved the following steps:

1. Prepare an inventory and analysis of existing resources and land uses. That inventory was published in February 2006 as the *Summary of Shoreline Ecological Functions and Conditions in Snohomish County*. This document provided baseline information on shoreline physical, biological and development conditions in the County and served as the basis for creating new shoreline designations, regulations and revised County code.
2. Determine new shoreline environment designations based on their physical, biological and development characteristics. These designations provide a way for the County to create and apply targeted policies and regulations based upon the intent of each environment and its specific conditions.
3. Review and revise existing SMP goals and policies.
4. Integrate shoreline regulations into the County code. The whole of the revised regulations and the manner in which they are integrated into the County code is referred to as the “Proposed Program” or the “proposed SMP.”
5. Prepare a restoration plan.

As part of revising the SMP, the DOE also requires a Cumulative Impact Analysis (CIA), as described by the following regulatory language:

*Local master programs shall evaluate and consider cumulative impacts of reasonably foreseeable future development on shoreline ecological functions and other shoreline functions fostered by the policy goals of the act. To ensure no net loss of ecological functions and protection of other shoreline functions and/or uses, master programs shall contain policies, programs, and regulations that address adverse cumulative impacts and fairly allocate the burden of addressing cumulative impacts among development opportunities. Evaluation of such cumulative impacts should consider:*



- (i) *Current circumstances affecting the shorelines and relevant natural processes;*
- (ii) *Reasonably foreseeable future development and use of the shoreline; and*
- (iii) *Beneficial effects of any established regulatory programs under other local, state, and federal laws. (WAC 173-26-186)*

## 1.1 Major Elements of the Proposed Program

The Existing Program consists of those regulations currently used as the shoreline master program for Snohomish County. Snohomish County commissioners adopted the Existing Program on September 25, 1974 and September 30, 1974. The Washington State DOE approved the program on December 26, 1974. Snohomish County most recently adopted revisions to the SMMP in June 1993.

The elements of the Proposed Program are contained in a revised Shoreline Management Program for an updated Snohomish County shoreline jurisdiction. The Proposed Program contains goals, policies and regulations for the management of land within 200 feet of the ordinary high water mark (OHWM) and the associated 100-year floodplain. Shorelines are defined to include lakes, rivers and streams, and marine shorelines. A detailed comparison of the existing and revised SMP is provided in Chapter 3 of the Snohomish County Proposed SMP Draft Environmental Impact Statement (DEIS). In summary, the Proposed Program contains the following substantive changes:

- A modest increase in regulated shoreline area: The Proposed Program changes the total acreage, including land and water areas, within the shoreline jurisdiction from approximately 132,280 acres to 139,872 acres of land, an increase of approximately 7,592 acres. The principal change in acreage is from the inclusion of Spada Lake (about 1,800 acres water area and 452 acres upland) in the County shoreline jurisdiction. Prior to this, Spada Lake was entirely surrounded by federally owned lands. Other changes in acreage relate to the identification of lakes and stream reaches now included in the shoreline jurisdiction that were not identified when the Existing Program was prepared in 1974. In addition, areas deleted from the SMP include areas annexed into cities within Snohomish County since 1974.
- New environment designations: The existing regulations contain five environment designations: Natural, Conservancy, Rural, Suburban and Urban. The Proposed Program contains seven:
  1. Aquatic,
  2. Natural,
  3. Resource,
  4. Municipal Watershed Utility,
  5. Rural Conservancy,
  6. Urban Conservancy, and
  7. Urban.

The Proposed Program provides classification information, designation criteria, and management policies for each designation.

- Revised shoreline use and modification policies: Both the existing and proposed shoreline programs contain similar types of policies; however, the Proposed Program has updated policies to support no net loss of shoreline ecological functions and to address recent updates to the shoreline guidelines in WAC 173-18, -20, -22, -26 and -27.

The state is phasing out the lists of specific shorelines, identified by waterbody name and county, from WAC 172-18 and -20 and will rely instead on local jurisdictions to identify shorelines in their SMPs using the criteria for stream flow rate (WAC 173-16-044) and lake size (WAC 173-20-044).

## 1.2 Content of the CIA

This document constitutes the Snohomish County CIA and has been prepared in compliance with the DOE Guidelines. The approach taken in this analysis, described further in the “Methods” section below, is threefold:

1. Estimate the level of foreseeable future development by shoreline reach and type (e.g., lake, river/ stream, and marine);
2. Estimate the level of new lot creation through land subdivision by shoreline environment designation; and
3. Assess potential impacts to shoreline ecological functions that may arise under the Proposed Program designations and requirements and the foreseeable future conditions.

It is recognized that methods of determining reasonably foreseeable future development may vary according to local circumstances, including demographic and economic characteristics and the nature and extent of local shorelines. In addition, given the scope of this project and the data available, it was often necessary to generalize about potential impacts to ecological functions across a relatively broad geographic area.

This report includes a description of the methods used to prepare this CIA. Included in the next section (2.0) is a list of the assumptions used in the analysis. Section 3.0 describes the cumulative impacts of the Proposed Program upon shoreline functions. The analysis compares existing shoreline conditions and the current regulatory framework with the proposed regulatory framework and reasonably foreseeable development patterns. The analysis is broken down into the three types of water bodies for consistency with the shoreline inventory prepared as part of the SMP update process. It should be noted that there is no regulatory distinction between the types of shoreline. Regulatory distinctions are instead directly related to the shoreline environment designation.

## 2.0 METHODOLOGY

The CIA includes the following steps:

1. Identify reaches to be evaluated using GIS. While the original assumption was that the lake, river/stream, and marine reaches should be the same as the “segments” used for the County shoreline inventory process, this turned out not to be the case. For the County shoreline inventory, the segment boundaries were derived from the physical/biological features found on site. However, the CIA requires an analysis of the entire area considered under any particular environment designation.

Analysis was done at the parcel level. The parcel-level data can be evaluated in the aggregate by shoreline environment designation or compiled by specific geographic area: watershed, subbasin, or individual lake, stream or marine shoreline. If a parcel contained any designated shoreline area it was included in the analysis in its entirety. Thus, the area covered by shoreline parcels is larger than the actual area designated under the proposed SMP. In addition, some parcels contain more than one shoreline environment. For example, parcels along the Sultan River contain up to three shoreline environment designations (Aquatic, Urban and Urban Conservancy) as well as area outside of shoreline jurisdiction. This results in some overstating of potential impacts due to double counting when parcels are evaluated based on shoreline environment.

The Aquatic shoreline environment is not evaluated individually in this CIA. Most development activities do not occur below the ordinary high water mark (OHWM), more typically occurring in the adjacent upland shoreland environments. However, shoreline modifications below the OHWM, such as docks and bank armoring, usually occur in conjunction with adjacent upland development and were evaluated in this analysis.

2. Use existing County GIS data layers to describe and/or calculate current conditions for variables most relevant to the CIA. Data sources and criteria for each of the variables are described below, along with appropriate WAC citations, where relevant.
  - Reach Name: Reach names are based on shoreline segment names provided by the County.
  - Watershed and Subbasin: This element was based on information within the County’s Total Impervious Area (TIA) GIS data layer and extrapolated to the new proposed environmental designation reach boundaries (proposed reaches). Not all reaches have this information in the database.
  - Water Type: The water type data layer was provided by Snohomish County and populated with the appropriate water body type: lake, river/stream or marine.
  - Existing Land Use Codes: This information was based on data contained within the County Assessor database for all parcels within proposed reach boundaries.
  - Future Land Use Codes: A County GIS layer based on codes adopted in December 2005 was summarized based on proposed reach boundaries.
  - Zoning: Data for this element was provided by the County as a separate GIS layer.

- Number of Parcels: This represents the total number of parcels that fall within a particular designation within each reach. Partial parcels are counted as one parcel; if any part of the parcel was within the shoreline environment, it is included in the count.
  - Parcel acres: This is the total acreage for all parcels within a particular designation within each reach.
  - Primary Structures: The number of primary structures was calculated based on the value of market improvements greater than zero for the parcel.
  - Development Potential: This was assessed based on the number and size of vacant parcels and on the potential for redevelopment of already-developed parcels which are large enough to subdivide given the underlying zoning. Government-owned lands and parcels enrolled in open space, agriculture or timber management tax classifications were not included as contributing to the development potential. For parcels inside of Urban Growth Areas, the data from the County's Growth Monitoring Report (2008) was used. Redevelopment potential also considers the dollar value of existing improvements and the ratio of improvement value to land value.
  - Waterfront Parcels: This represents the number of waterfront parcels within the designation with each reach, and was calculated by determining which parcels are within a given distance of the Aquatic shoreline environment. This element was intended to add information on potential future armoring under the assumption that only the parcels that directly intersect with the water would have a reason to armor the shoreline or build a dock/ramp.
  - Est. Impervious Area: This variable was calculated by multiplying the number of primary structures for each designation within each reach by 3,150 square feet and converting to acres. The 3,150 figure is based on Spokane County's Comprehensive Stormwater Management Plan (Spokane County 2005) that used aerial photographs and plat data from several hundred parcels together with GIS analysis to determine the approximate TIA for each residential unit.
  - Est. Vegetation Clearing: This is calculated by multiplying the number of primary structures for each designation within each reach by 4,000 square feet and converting it to acres. The 4,000-square-foot value is based on the clearing limits for single-family development adopted under the County's critical area regulations.
  - Armoring: This figure is based on the County's armoring line data layer. The length was an attribute in the armoring GIS line. This is an incomplete data set for the County.
  - Ramps/Docks: This was based on the County's ramps data line file and docks GIS layer. This number represents a total count of all parcels with ramps plus all parcels with docks within each designation in each reach. A blank value (or n/a) indicates no information available. This is also an incomplete data set for the County.
3. Calculate foreseeable future development for each proposed reach area. To maintain consistency with GMA planning protocols, forecasts were based on the expected future growth from 2007 to 2025 proportionally allocated into shoreline areas based on the share of total land capacity available in shoreline areas. The share of total lot growth allocated to shoreline areas is 3,021 new lots during the planning period – 1,039 inside of the UGAs and 1,982 new lots outside. This estimated lot growth was then used to calculate the following:



- Primary use structures
- Estimated impervious area
- Vegetation clearing
- Armoring
- Ramps/docks

It should be noted that some of the proposed environment designations limit the extent/type of development allowed (see the use matrix from proposed SCC 30.67.430). Reaches affected by these new limitations would likely realize a lower-than-expected development rate. To determine the magnitude of this problem, a GIS analysis was conducted on the two upland environment designations – Natural and Urban Conservancy – that contain the most stringent development standards (e.g., restrictions on clearing vegetation and new ramps/docks in both Natural and Urban Conservancy). This analysis revealed that parcels containing any amount of each of these two upland designations represent a very small percentage (less than 3 percent) of the 26,570 total shoreland parcels within the County. Therefore, the straight percentage was applied with the understanding that the foreseeable future development calculations likely overestimate potential development and, therefore, cumulative impacts to shoreline functions.

Environmental constraints would further limit the amount, placement and design of development within shoreline jurisdiction. Development on steep slopes, wetlands and channel migration zones is significantly limited. Such environmental constraints were not factored in to the analysis thus the results represent an overestimate of the potential development impacts.

4. Ranking of “high,” “moderate” and “low” potential future development areas. A ranking system was developed for each reach based on the number of new primary use structures expected over the planning period from 2007 - 2025.
  - “High” ranking indicates a forecast of 20 or more new primary structures during the planning period.
  - “Moderate” ranking indicates a forecast of 2 to 19 new primary structures during the planning period.
  - “Low” ranking indicates a forecast of 1 or fewer new primary structures during the planning period.

In the model, primary structures affect the vegetation clearing and impervious surface calculations directly, so that one variable can be used to indicate overall development impact. The number of new primary structures is the calculated based on the forecast of new lots. For lakes, an additional element was used as a secondary ranking tool – the number of new docks. For rivers, the potential for new bank stabilization was estimated based on the number of riverfront parcels with existing primary structures that are not currently armored.

5. Qualitative analysis of impacts. A qualitative analysis was performed, based in part on the analysis conducted as part of the EIS process, to determine how foreseeable growth patterns might result in impacts to shoreline functions. Four general categories of indicators of shoreline functions were evaluated for each area of high potential future growth (see Section 2.2 for descriptions): 1) hydrologic functions; 2) shoreline vegetation functions; 3) hyporheic functions;

and 4) habitat functions. A qualitative evaluation of indirect impacts associated with potential areas of future development was also conducted at a County-wide level.

6. Evaluate SMP policies and regulations to offset impacts. A qualitative analysis was performed to determine what applicable regulations related to each of the impacts identified, and what, if any regulations should be added or expanded to create more protection.

The quantitative analysis was completed with GIS and exported to MS Excel tables. The results of that analysis are provided at the sub-reach level, given that individual reaches often have several different environment designations. The full database is included in section 5.2 including the details for each reach and shoreline environment designation. Given the available project resources and the size of the County shoreline area, it was determined that much of the analysis for this report would need to be summarized at least up to the reach level, instead of the sub-reach level, despite the fact that there is often variability in the types of designations and land uses within each reach.

Included in the analysis is an estimate of the impacts from future subdivision of vacant and under-developed land. Section 4.1.2 contains a general discussion of how subdivisions would be regulated under the proposed SMP and other county policies (e.g., zoning requirements and County CAR); and how such regulations and policies would offset potential direct and indirect impacts to shoreline areas that may result from future subdivisions.

## 2.1 Data Gaps and Limitations

There are several elements that are required by WAC 173-26-201(3)(c) for inclusion in the SMP process but that were unavailable at the time of this study. Those data gaps include:

- Fill: There are no existing data sets to determine the amount of fill within parcels or reaches of the County.
- Dredging or Disposal Activities: No data is available on dredging or disposal activities.
- Public Access/Views: Limited data layers exist for this element.
- Critical area data is not included in the analysis. This data set is not complete and adjustments to development potential are determined on a site-by-site basis. Exclusion of critical area considerations results in an overestimate of the development potential since related environmental constraints typically reduce development intensity. The critical area regulations are evaluated as offsets to potential development impacts in section 4.0.
- Aquatic environment designation was not specifically addressed in this parcel-based analysis. Very few parcels exist that are entirely below the ordinary high water mark (OHWM). Waterfront parcels usually have both an upland designation and an Aquatic designation where the property extends below the OHWM. Aquatic areas are usually developed in relation to their adjacent upland designated areas (i.e., docks, bulkheads, boat launch, etc.). These types of modifications to Aquatic areas are included in this analysis as are the potential impacts to the aquatic shoreline functions resulting from upland development activities. Impacts to Aquatic areas are attributed to the adjacent upland designation.

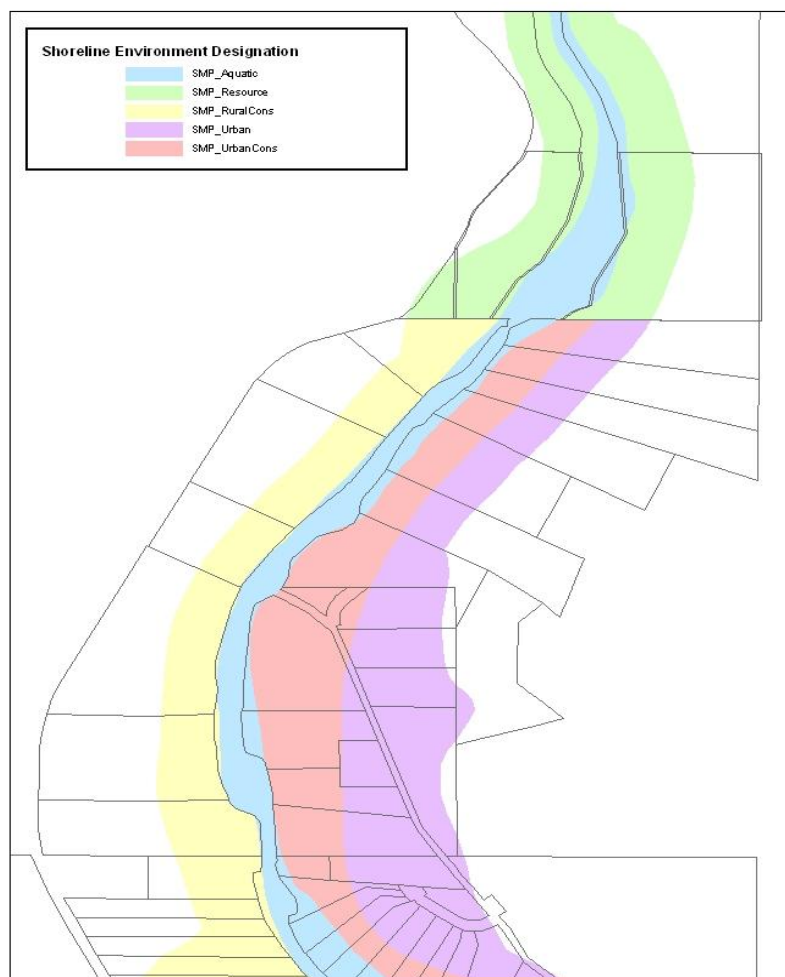
- Municipal Watershed Utility (MWU) environment designation was not specifically addressed in this parcel-based analysis because development is restricted in this area subject to the licensing agreement with the Federal Energy Regulatory Commission.
- Areas within the boundaries of United States Forest Service lands were not evaluated for development impacts because of limited data for these remote areas. Development potential is very limited in these largely inaccessible areas. Activities are generally limited to recreation cabins, hiking and some old mining claims.
- In some cases a single parcel contains more than one shoreline environment designation. The analysis calculates the development potential for these parcels separately for each of the individual designations resulting in double counting of impacts. Table 1 shows the extent of this potential double counting by identifying the number of parcels (and their acreages) which contain two different shoreland designations. The Aquatic designation was not included because it would result in double counting for nearly every waterfront parcel. Figure 1 provides an illustration of this issue along the Sultan River.

**Table 1: Extent of Shoreline Environment Designation Overlap**

Shoreline Environment Designations		Overlap:				
		Natural	Resource	Rural Conservancy	Urban	Urban Conservancy
Natural	Parcels					
	(Acres)					
Resource	Parcels	19 *				
	(Acres)	(3845)				
Rural Conservancy	Parcels	50	13			
	(Acres)	(1367)	(486)			
Urban	Parcels	0	6	14		
	(Acres)	0	(170)	(105)		
Urban Conservancy	Parcels	1	10	3	66 **	
	(Acres)	(4)	(56)	(10)	(186)	
MWU	Parcels	0	1	0	0	0
	(Acres)	0	(59)	0	0	0

\* Five parcels are over 600 acres each and one is over 300 acres – only a small portion of each is actually within shoreline jurisdiction – accounting for most of the acreage attributed to the overlap (the six largest parcels account for 3525 acres).

\*\* Most of the overlap with the Urban and Urban Conservancy environments occurs along the Sultan River. This is the area shown in Figure 1.



Individual parcels may have multiple shoreline environment designations. In the example shown here, parcels on the right (east) bank of the river may contain as many as three designations: Aquatic, Urban Conservancy and Urban. These parcels would be counted in the totals under both Urban and Urban Conservancy resulting in double-counting if the numbers are totaled over all the shoreline environment designations.

Note also that the Sultan River itself is not parcelized – most parcels extend only to the water’s edge but some appear to extend below the OHWM. The river itself is not contained within a parcel, or lot, with ownership and physical attributes recorded in the data.

**Figure 1. Parcels with multiple shoreline environment designations.**

## 2.2 Indicators of Shoreline Ecological Functions

This methodology relies upon the well-established relationship between shoreline development and impacts to shoreline ecological function. In essence, areas that are revealed by the GIS analysis to have potentially high rates of future development are expected to be those where potential exists for impacts to shoreline function. As specified by WAC 173-26-201(3)(i), shoreline ecological functions that should be addressed in the SMP process include:

- *In rivers and streams and associated flood plains:*
  - *Hydrologic: Transport of water and sediment across the natural range of flow variability; attenuating flow energy; developing pools, riffles, gravel bars, recruitment and transport of large woody debris and other organic material.*



- *Shoreline vegetation: Maintaining temperature; removing excessive nutrients and toxic compound, sediment removal and stabilization; attenuation of flow energy; and provision of large woody debris and other organic matter.*
- *Hyporheic functions: Removing excessive nutrients and toxic compound, water storage, support of vegetation, and sediment storage and maintenance of base flows.*
- *Habitat for native aquatic and shoreline-dependent birds, invertebrates, mammals; amphibians; and anadromous and resident native fish: Habitat functions may include, but are not limited to, space or conditions for reproduction; resting, hiding and migration; and food production and delivery.*
- *In lakes:*
  - *Hydrologic: Storing water and sediment, attenuating wave energy, removing excessive nutrients and toxic compounds, recruitment of large woody debris and other organic material.*
  - *Shoreline vegetation: Maintaining temperature; removing excessive nutrients and toxic compound, attenuating wave energy, sediment removal and stabilization; and providing woody debris and other organic matter.*
  - *Hyporheic functions: Removing excessive nutrients and toxic compound, water storage, support of vegetation, and sediment storage and maintenance of base flows.*
  - *Habitat for aquatic and shoreline-dependent birds, invertebrates, mammals; amphibians; and anadromous and resident native fish: Habitat functions may include, but are not limited to, space or conditions for reproduction, resting, hiding and migration; and food production and delivery.*
- *In marine waters:*
  - *Hydrologic: Transporting and stabilizing sediment, attenuating wave and tidal energy, removing excessive nutrients and toxic compounds; recruitment, redistribution and reduction of woody debris and other organic material.*
  - *Vegetation: Maintaining temperature; removing excessive nutrients and toxic compound, attenuating wave energy, sediment removal and stabilization; and providing woody debris and other organic matter.*
  - *Habitat for aquatic and shoreline-dependent birds, invertebrates, mammals; amphibians; and anadromous and resident native fish: Habitat functions may include, but are not limited to, space or conditions for reproduction, resting, hiding and migration; and food production and delivery.*
- *Wetlands:*
  - *Hydrological: Storing water and sediment, attenuating wave energy, removing excessive nutrients and toxic compounds, recruiting woody debris and other organic material.*
  - *Vegetation: Maintaining temperature; removing excessive nutrients and toxic compound, attenuating wave energy, removing and stabilizing sediment; and providing woody debris and other organic matter.*
  - *Hyporheic functions: Removing excessive nutrients and toxic compound, storing water and maintaining base flows, storing sediment and support of vegetation.*

- *Habitat for aquatic and shoreline-dependent birds, invertebrates, mammals; amphibians; and anadromous and resident native fish: Habitat functions may include, but are not limited to, space or conditions for reproduction, resting, hiding and migration; and food production and delivery.*

In the Snohomish County Inventory, four general categories of “indicators” were used to provide information on the above-described shoreline functions across the different waterbody types. These four categories are used in this analysis as well and are directly related to shoreline development.

- **Vegetation:** Nearly every type of shoreline development decreases riparian vegetation and holds the potential to negatively impact shoreline functions. Vegetation is considered directly in the CIA in the form of the vegetation clearing and estimated impervious area variables, and indirectly in the form of number of primary structures.
- **Water movement:** Water movement (the general term for the hydrological and hyporheic functions described above) is indirectly considered in the CIA in the form of the armoring and ramps or docks variables, as these types of features would serve to limit the natural flows and wave energy of river and marine systems. Vegetation clearing and estimated impervious surface are also indirect indicators of changes in hydrologic patterns and hyporheic functions in many shoreline systems.
- **Water quality:** Water quality can be directly impacted by waterfront development in the form of nutrient and pollutant runoff. It is considered indirectly in this analysis in the form of the waterfront parcels, number of primary structures and estimated impervious area variables.
- **Habitat:** Habitat is also almost always impacted by shoreline development. Habitat-related functions are considered indirectly in the CIA in the form of the primary use structures, vegetation clearing, estimated impervious surface, armoring and ramps/docks variables.



**Hat Slough estuary,  
Stillaguamish River.**

*(Photo credit:  
Washington State  
Dept. of Ecology,  
Washington Coastal  
Atlas, 2006)*

Tables 14A, B and C in chapter 4 show the major types of foreseeable future development and how they may impact shoreline ecological functions. Table 15 shows the regulatory offsets to avoid, minimize and mitigate development impacts on each of these ecological functions.

The Supplemental Environmental Impact Statement (SEIS) prepared to analyze the potential impacts of the proposed SMP provides a detailed discussion of the existing ecological functions at risk by shoreline type (lake, river, marine) and by basin for riverine areas (SEIS, Chapter 3, January, 2010).

## 3.0 IMPACT ANALYSIS

In this section, the potential impacts from development in shoreline areas are assessed from two perspectives: 1) impacts by water type; and 2) impacts by shoreline environment designation. Water type (lake, marine and river) provides an indication of the ecological functions at work. These ecological processes can vary by water type, for example, beach sediment recruitment and transport along marine shorelines and channel migration zones along river shorelines are processes unique to the specific shoreline type (refer to section 2.2). Impacts from development on these ecological processes are expected to be offset by the County's critical area regulations.

The analysis also looks at impacts on areas within each of the shoreline environment designations. SMP regulations addressing allowed uses and development standards vary by shoreline environment. The regulations are designed to offset development-related impacts based on the ecological sensitivity of the environment designation. Offsets designed to prevent, minimize and mitigate development impacts on shorelines are addressed in the next section (4.0).

The results reported in this cumulative impact analysis are based on a forecast model using data from the County's Geographic Information System. Many factors not considered by the model enter into determining the type and scale of development that ultimately gets approved on any given property. The impacts reported here should in no way be construed as approval from the County for such development.

### 3.1 Potential Impacts by Water Type

#### 3.1.1 Lake Shorelines

##### ***Existing Conditions***

Under the existing SMMP, a total of 44 lakes fall within the County's shoreline jurisdiction. These lakes and their shorelines constitute 114 miles of shoreline length and 5,231 acres in area. Four of the 44 lakes that fall under existing shoreline regulations are more than 70 percent developed, and five of the 44 lakes are predominantly undeveloped. Across the County, 42 percent of all lake shoreline is currently affected by some type of shoreline armoring. In general, current primary land uses on lake shorelines are single-family residential and duplex (75 percent), resource production (8 percent), undeveloped (13 percent), parks and recreation (4 percent) (Snohomish County 2006, 2009(a)). Most of the current lake shoreline area (3,598 acres, or 68.7 percent) has an environmental designation of Suburban.

### ***Proposed Conditions***

Under the Proposed Program, 50 lakes are designated as shorelines covering 8,077 acres, of which 5,265 acres are water area and 2,812 acres are shoreland. The Proposed Program includes 11 new lakes that were previously not regulated as shoreline, and removes five lakes - four out in federally owned lands and one which has naturally filled in enough such that it no longer meets the 20 acre threshold (Hanson Slough). These changes in lake designation in the Proposed Program are shown in Table 2.

Most (2,200 acres, or 68.5 percent) of the newly regulated lake shoreline is the result of one newly regulated lake – Spada Lake – which is impounded by a hydroelectric dam and used as a public water supply. Spada Lake (1776 acres) and its shorelands (445 acres) are designated Municipal Watershed Utility. Development around Spada Lake is restricted by the conditions of the Federal Energy Regulatory Commission license for the dam. The only current and foreseeable future development along this lake is related to the infrastructure necessary to maintain its status as a Public Utilities District (PUD) water reservoir. No future residential or other development is anticipated.

**Table 2: Proposed Changes in Lake Designations**

<b>Lakes Added to the Proposed SMP</b>	<b>Lakes Removed from the Proposed SMP</b>
Connor	Blanca*
Getchell	Copper
John Sam	Evangeline
Getchell	Hanson Slough
Mud	Sunset
Spring	
Spada	
Swartz	
Twin (north)	
Twin (south)	
Wagner	

\* Lakes like Blanca Lake located out in the Mount Baker Snoqualmie National Forest are under federal jurisdiction rather the county jurisdiction. However, should lands be transferred into private ownership or leased for private use, any such private development activities would be subject to the county's shoreline jurisdiction. These lakes and rivers subject to potential shoreline jurisdiction which are located out in federal areas are shown on the countywide map. Those in the national forest are assigned a Resource shoreline environment designation and those in federal wilderness areas are assigned a Natural shoreline environment designation.

### ***Foreseeable Future Development***

The most common environment designations under the Proposed Program along lake shoreline parcels is Rural Conservancy; 79 percent of lake parcels contain a Rural Conservancy designation. It is

anticipated that lake shoreline areas will experience the following types of development over the next 10 years:

- Continued residential development of lakes with already high modification levels, which would include armoring, view corridor tree removal and trimming, vegetation clearing, etc.
- Construction of new docks or piers associated with residential use.
- Continued and expanded light agricultural use.
- Creation of new parks and public access sites.

Calculations of foreseeable future development along lake shorelines indicate that areas most likely to exhibit the greatest development over the next 10 years are those that are in the urban areas. As described in the methods section (Section 2.0, Number 3), calculations of foreseeable future development use one variable – the number of primary structures – as an indicator of overall development impact. It is assumed that construction and use of new primary structures will result in the types of activities that could directly impact shoreline function – vegetation clearing, creation of new impervious surfaces, shoreline modifications, increased runoff, etc.

Calculations for new docks and shoreline armoring are inferred from upland development conditions. New docks are based on the number of existing and new primary structures that do not currently have docks. New bulkheads are based only on the existing primary structures currently without bulkheads. New bulkheads were not attributed to new primary structures as the regulations allow new bulkheads only to protect existing primary structures.

### ***Lake Reaches Ranked as “High” for Potential Future Development***

Table 3 shows the lake shoreline reaches that were ranked as “high” for potential future development. These reaches are estimated to have more than 20 new primary structures over the planning period. Lake reaches are distinguished by shoreland environment designation. Some lakes (ex., Stickney – see Figure 2, Crystal, Cassidy) have more than one environment designation along their shorelines and are thus divided into more than one reach. Most lakes have only one shoreland environment and thus the reach is comprised of the lakes’ entire shoreline area. The full data for these lakes is available in section 5.2 arranged by reach ID.

**Table 3. Lake Reaches Ranked as “High” for Potential Future Development**

<b>LAKES</b>			<b>Forecast of Potential Impacts</b>					<b>Development Intensity</b>	
<b>Reach ID</b>	<b>Water Name</b>	<b>Environment Designation</b>	<b>New Primary Structures</b>	<b>New Impervious Surface (acres)</b>	<b>New Vegetation Clearing (acres)</b>	<b>Parcels w/ new armoring</b>	<b>New Docks</b>	<b>Primary Structures per acre (existing)</b>	<b>Primary Structures per acre (new)</b>
103	<b>Stickney</b>	Urban Conservancy	49	3.58	4.54	n/a	7	0.186	1.336
103	<b>Stickney</b>	Urban	37	2.66	3.38	n/a	15	1.314	2.366
98	<b>Roesiger</b>	Rural Conservancy	34	2.47	3.14	n/a	7	1.656	1.790
102	<b>Stevens</b>	Urban	32	2.28	2.90	n/a	34	1.885	2.214

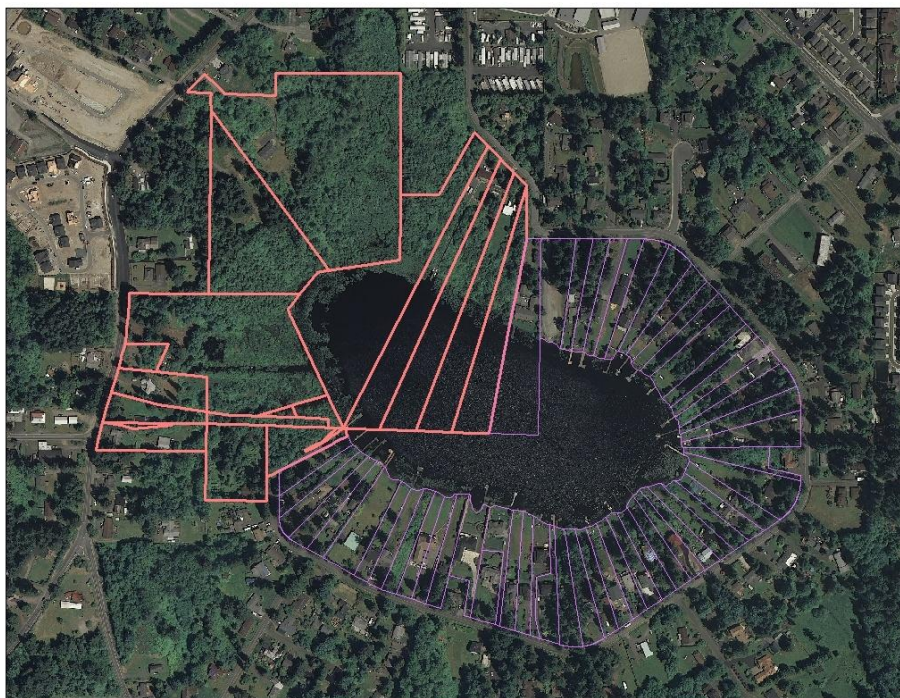


Four lake reaches are rated as “High”:

- **Lake Stickney** is located in the southwest County UGA and is surrounded by urban development. The northeast, east and south shorelines are developed for single-family residential uses. Most of the residential lots are cleared with lawns extending to the water’s edge. These areas are proposed for Urban designation. The northwest shoreline is undeveloped containing an intact wetland system associated with Swamp Creek and is proposed for Urban Conservancy. This wetland plays a key role attenuating water levels and flow to Swamp Creek, improving water quality and providing habitat.

**(Urban Conservancy):** The west end of Lake Stickney is designated Urban Conservancy and consists of 18 parcels covering 43 acres. The future development calculations estimate that approximately 49 new parcels in this area may be built upon and approximately 7 new docks could be constructed over the planning period. This development potential will likely not be reached because several parcels include acreage extending well out into the water (see Figure 2). Since this area below the ordinary high water mark is included in the parcel acreage data, it was included in the future development calculations. Only the upland portions of these parcels can be developed with new primary structures. The presence of wetlands on the west side of the lake will further reduce the ultimate development potential.

**(Urban):** The Urban-designated portion of Lake Stickney’s shoreline on the lake’s east and south sides contains 53 parcels covering 35 acres. There are six vacant parcels and a total of 52 parcels are large enough to subdivide assuming a higher urban density of 7,200 square feet per lot. The forecast indicates that 37 new primary structures and 15 new docks may be developed. Unlike the Urban Conservancy parcels, the Urban parcels around Lake Stickney do not extend out into the water with one exception. The average assessed market improvement value for these urban parcels is \$223,600 which suggests a greater likelihood of re-development.



**Figure 2.**  
Lake Stickney, 2007,  
showing Urban (purple)  
and  
Urban Conservancy  
(pink) parcel  
boundaries.



Too offset potential impacts, development should employ measures to protect water quality, preserve the existing wetlands and hydrologic connections to Swamp Creek and prevent habitat disruption. To further offset potential impacts, Lake Stickney (and Swamp Creek) would benefit from wetland and riparian vegetation restoration along the Urban shoreline.

- **Lake Roesiger:** Lake Roesiger is located in rural Snohomish County east of Lake Stevens. While it is not on the state Department of Ecology's 303d list for water quality issues, it is the focus of restoration efforts related to aquatic plants (Figure 3). The shoreline is heavily developed with over 85% of the waterfront parcels developed for single family residential use. Average waterfront parcel size is 0.8 acres. This level of development combined with lawns extending to the water's edge and reliance on on-site septic systems contributes to future water quality concerns. There are more docks on Lake Roesiger (426) than on any other lake in the County (Goodwin, 342 docks; Stevens, 403 docks). Power boats and water skiing are allowed on the north and south portions of the lake.

Lake Roesiger is surrounded by 537 parcels covering 256 acres. There are 108 vacant parcels and no parcels (vacant or non-vacant) are large enough to subdivide given the rural zoning. The future development calculations estimate that approximately 34 new parcels will be built upon and 7 new docks would be constructed over the planning period. The proposed designation for the lake area waterward of the OHWM is Aquatic, and the proposed designation for the shoreline area landward of the OHWM is Rural Conservancy.



**Figure 3.** Lake Roesiger's "Middle Lake". (Photo credit: Washington State Dept. of Ecology, Washington Coastal Atlas, 2006)

Too offset potential impacts, development should employ measures to protect water quality, preserve the existing upstream and downstream hydrologic connections to the lake's tributaries and to Woods Creek and prevent fish passage blockages and habitat disruption. Lake Roesiger is sensitive to nutrient pollution so attention to stormwater runoff and on-site sewage systems is key to preserving water quality. To further offset potential impacts, Lake Roesiger would benefit from wetland and riparian vegetation restoration along the shoreline. Restoration efforts could also address options for reducing impacts from docks and bulkheads to improve habitat quality and natural water movement. Continued milfoil removal efforts will also improve habitat value.

- **Lake Stevens:** The southeast end of Lake Stevens is in the County's shoreline jurisdiction. The proposed designation for the lake area waterward of the OHWM is Aquatic, and the proposed designation for the shoreline area landward of the OHWM is Urban. The lake shoreline is heavily developed for single family residential use; over 87% of the waterfront parcels are developed and 73% have docks. This lake is used for recreational boating and water skiing and many of the properties have been protected from wave action by bulkheads (see Figure 4). Lake Stevens is identified on the state Department of Ecology's 303d list for phosphorus levels.



**Figure 4.** Lake Stevens. (Photo credit: Washington State Dept. of Ecology, Washington Coastal Atlas, 2006)

In this area of the lake there are 214 parcels covering 96 acres. Only 30 parcels are vacant and available for development, 11 of which may be large enough to subdivide based on an urban lot size

of 7,200 square feet. The future development calculations estimate that approximately 32 new parcels in this area may be built upon and approximately 34 new docks could be constructed during the planning period. Most of the development potential is attributed to possible subdivision of already-developed lots. Given the average improvement value on the developed lots of over \$330,000, this re-development potential may never be realized.

To offset potential impacts, development should employ measures to protect water quality, preserve the existing upstream and downstream hydrologic connections to the lake's tributaries and to Catherine Creek and prevent fish passage blockages and habitat disruption. To further offset potential impacts, Lake Stevens would benefit from wetland and riparian vegetation restoration along the shoreline. Restoration efforts could also address options for reducing impacts from docks and bulkheads to improve habitat quality and natural water movement. Continued efforts to reduce phosphorus levels are important for the lake's water quality. Fish-friendly improvements to the outlet weir could improve fish passage during periods of low water levels.

*[Note: The southwest shoreline of Lake Stevens has since been annexed by the City of Lake Stevens.]*

### ***Lake Reaches Ranked as “Moderate” for Potential Future Development***

“**Moderate**” reaches are those that were estimated to have between 2 and 19 new primary structures over the planning period. Table 4 shows the twenty-nine lake reaches ranked as “moderate”. The lakes with the greatest potential impacts are discussed individually below. The remaining lake reaches in this category are summarized. The complete data for each lake is available in Section 5.0.

Lake reaches with the greatest development potential in the “moderate” development category are:

- **Connor:** The Lake Connor area is developed as a park. There are nine parcels covering a total of 245 acres – most of which is outside of shoreline jurisdiction extending well beyond 200 feet from the OHWM. If this area was to be redeveloped under current zoning, the forecast model predicts 19 new primary structures and one new dock.

Wetlands and riparian vegetation are primarily intact. Future development activities should be sensitive to preservation of the existing ecosystem. Data regarding water quality is not available.

- **Crabapple:** Crabapple Lake is surrounded by 57 parcels covering 270 acres – most of which is outside of shoreline jurisdiction and devoted to Camp Killoqua (182 acres) on the west end of the lake. It is expected that the planning period will bring approximately 18 new primary structures and 1 new dock. Crabapple Lake currently contains both modified (residential) and unmodified segments.

Crabapple Lake is showing signs of eutrophication resulting from development-related increases in stormwater runoff. Careful management of impervious surface, riparian vegetation, wetlands, stormwater runoff and on-site sewage systems would improve overall water quality. Public education regarding best management practices for yard maintenance and animal waste removal could also be beneficial.

**Table 4. Lake Reaches Ranked as “Moderate” for Potential Future Development**

LAKES			Forecast of Potential Impacts					Development Intensity	
Reach ID	Water Name	Environment Designation	New Primary Structures	New Impervious Surface (acres)	New Vegetation Clearing (acres)	Parcels w/ new armoring	New Docks	Primary Structures per acre (existing)	Primary Structures per acre (new)
74	Connor	Rural Conservancy	19	1.35	1.71	n/a	1	0.029	0.105
75	Crabapple	Rural Conservancy	18	1.31	1.66	n/a	1	0.181	0.248
82	Goodwin	Rural Conservancy	17	1.26	1.60	n/a	6	1.550	1.621
84	Howard	Rural Conservancy	14	1.03	1.31	n/a	3	1.128	1.493
99	Serene	Urban	13	0.95	1.21	n/a	15	2.088	2.318
93	Martha (south)	Urban	12	0.84	1.06	n/a	25	1.638	1.837
69	Bosworth	Rural Conservancy	11	0.80	1.02	n/a	6	1.320	1.431
73	Cochran	Rural Conservancy	10	0.71	0.91	n/a	3	0.283	0.338
71	Cassidy	Rural Conservancy	9	0.69	0.87	n/a	5	0.371	0.507
92	Martha (north)	Rural Conservancy	9	0.69	0.87	n/a	4	0.464	0.510
88	Ketchum	Rural Conservancy	8	0.59	0.76	n/a	5	0.887	1.003
89	Ki	Rural Conservancy	8	0.57	0.72	n/a	6	0.810	0.865
79	Flowing	Rural Conservancy	7	0.50	0.64	n/a	5	0.637	0.673
101	Spring	Rural Conservancy	7	0.50	0.63	n/a	5	0.172	0.216
81	Getchell	Rural Conservancy	6	0.47	0.59	n/a	2	0.068	0.097
95	Panther	Rural Conservancy	6	0.46	0.58	n/a	3	0.303	0.351
97	Riley	Natural	6	0.43	0.55	n/a	0	0.013	0.054
100	Shoecraft	Rural Conservancy	6	0.43	0.55	n/a	4	1.061	1.113
104	Storm	Rural Conservancy	6	0.42	0.54	n/a	3	0.316	0.354
85	Hughes	Rural Conservancy	6	0.42	0.53	n/a	0	0.007	0.026
71	Cassidy	Natural	5	0.39	0.49	n/a	2	0.018	0.036
91	Loma	Rural Conservancy	5	0.37	0.46	n/a	5	1.651	1.769
105	Sunday	Rural Conservancy	5	0.33	0.41	n/a	4	0.282	0.317
72	Chain	Rural Conservancy	4	0.31	0.40	n/a	1	0.061	0.114
68	Armstrong	Rural Conservancy	4	0.28	0.35	n/a	2	0.132	0.168
106	Swartz	Rural Conservancy	3	0.25	0.32	n/a	2	0.179	0.231
86	John Sam	Rural Conservancy	3	0.23	0.29	n/a	4	2.611	2.787
76	Crystal	Rural Conservancy	3	0.18	0.23	n/a	3	0.615	0.648

109	Wagner	Rural Conservancy	2	0.16	0.20	n/a	1	0.172	0.196
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- **Goodwin:** There are 437 parcels covering 242 acres surrounding Lake Goodwin. While the lake is not on the state Department of Ecology's 303d list for water quality issues, it is the focus of restoration efforts related to aquatic plants. Over 88% of the waterfront parcels are developed with primary structures and docks. Average waterfront parcel size is less than ½ acre. This level of single family residential development combined with lawns extending to the water's edge and reliance on on-site septic systems may contribute to future water quality concerns. In addition, there are two popular County parks on the shores of Lake Goodwin.

There are 55 vacant lots none of which are large enough to subdivide given the rural zoning. Two non-vacant parcels are large enough to subdivide but are owned by the County and already developed as parks. The future development calculations estimate that approximately 17 new parcels will be built upon and potentially 6 new docks would be constructed over the planning period. The proposed designation for the lake area waterward of the OHWM is Aquatic, and the proposed designation for the shoreline area landward of the OHWM is Rural Conservancy.

Lake Goodwin is hydrologically connected to Crabapple Lake and Lake Shoecraft. Protection of groundwater and hyporheic exchange is key to preserving the natural ecology. To further offset potential impacts, Lake Goodwin would benefit from wetland and riparian vegetation restoration along the shoreline. Restoration efforts could also address options for reducing impacts from docks and bulkheads to improve habitat quality and natural water movement. Addition of habitat features such as large woody debris and riparian vegetation would also be beneficial.

- **Howard:** Lake Howard is surrounded by 39 acres divided into 92 parcels about half of which are developed (44). There are 45 vacant parcels available for development. The future development calculations estimate that approximately 14 new parcels will be built upon and potentially 3 new docks would be constructed over the planning period.

Wetlands and riparian vegetation are primarily intact. Future development activities should be sensitive to preservation of the existing ecosystem. Even though only 28% of the lake shoreline is developed, Lake Howard is showing signs of eutrophication resulting from development-related increases in stormwater runoff. Careful management of impervious surface, riparian vegetation, wetlands, stormwater runoff and on-site sewage systems would improve overall water quality. Riparian restoration in developed areas may help to reduce eutrophication.

- **Serene:** Lake Serene's shoreline area contains 137 parcels covering 57 acres. Sixteen parcels are vacant and 83 parcels are large enough to subdivide (2 vacant and 81 non-vacant). Over the planning period the model forecasts 13 new primary structures and 15 new docks. Re-development of the non-vacant parcels assumes a higher urban density would be achieved comparable to the County's R-7200 zone. The average improvement value over all the non-vacant parcels is \$205,000 which suggests that some re-development may likely occur. Lake Serene has been the focus of restoration efforts related to aquatic plants.

Future development should address stormwater runoff. Lake Serene already experiences high water levels and flooding due to impervious surface in this urbanized basin. Restoration of riparian vegetation and continued efforts to restore aquatic plants will help preserve the lake's water quality.



- **Martha (south):** Martha Lake, located in the County's SW UGA, is surrounded by 141 parcels covering 58 acres of shoreline area. Eighty-four percent of the waterfront parcels are developed with single-family residential structures and docks. The lots average 0.4 acres in size. There are twelve vacant parcels and 99 parcels large enough to subdivide at higher urban densities (4 vacant, 95 non-vacant). The south end of the lake contains a County park. The lake is included on the state Department of Ecology's 303d list for phosphorus levels and is the focus of restoration efforts to remove aquatic plants. The model forecasts 39 new primary structures and 8 new docks. The average improvement value over all the non-vacant parcels is \$201,400 which suggests that some re-development may likely occur.

Most of the riparian vegetation has been removed. The lake suffers from high phosphorus levels and excessive use by waterfowl. Water movement out of the lake into Martha Creek, then into Swamp Creek, is impaired. This blockage, along with urban levels of impervious surface, causes high water levels and occasional flooding. Careful management of impervious surface, riparian vegetation and stormwater runoff would improve overall water quality. Riparian restoration would be beneficial.

- **Bosworth:** Lake Bosworth is surrounded by 170 parcels covering 100 acres. Most parcels are already developed (132 primary structures and 122 docks). Low land vacancy rate indicates that there may be only 11 new primary structures and 6 new docks.

Over 60% of Lake Bosworth's shoreline has been developed with riparian vegetation removed. New development should control runoff and prevent nutrient pollution. The lake would benefit from riparian vegetation restoration along the shoreline. Restoration efforts could also address options for reducing impacts from docks to improve habitat quality and natural water movement.

- **Cochran:** The Lake Cochran area has been divided up into 75 parcels many of which extend out into the water dividing the lake itself into separate ownership lots. The area is zoned Forestry which has a 20-acre minimum lot size but the forecast model uses a 5-acre zoning factor to calculate potential lot growth. The model forecasts 10 new primary structures and 3 new docks. Adjusting the model for the current zoning results in a lowered estimate of 7 new primary structures.

Residential development has reduced the riparian vegetation around the lake and water quality shows signs of sensitivity to nutrient pollution from runoff (nitrogen and phosphorus). New development should manage impervious surface, riparian vegetation, wetlands, stormwater runoff and on-site sewage systems to improve overall water quality. Riparian restoration in developed areas may help to reduce eutrophication.

It should be noted that the ranking method used in this analysis (for lakes and all reach types) relies upon raw numbers and is not scaled to the size of the reach. Intensity of development (primary structures per acre) may give a better indication of the potential impacts on shoreline ecological functions. Both the existing development intensity and the forecast intensity, including the new primary structures, were calculated for each reach. Several lakes are ranked as "moderate" in terms of new primary structures but are in reality are heavily developed. It should be noted that a "moderate" ranking for impacts related to new development does not mean that the shoreline has a moderate level of existing development. Lake Cassidy provides a good illustration comparing raw numbers to development intensity.

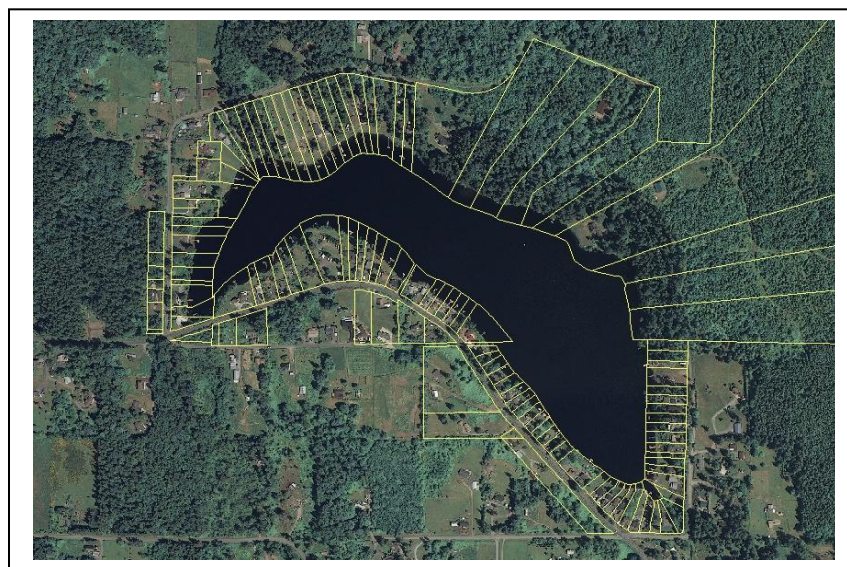


- Cassidy:** Lake Cassidy is divided into two reaches, a Rural Conservancy reach and a Natural reach, both of which are ranked as “moderate”. The Rural Conservancy reach along the south and west shorelines is expected to add 9 new primary structures increasing the development intensity from 0.371 primary structures per acre to just over 0.5 primary structures per acre. Figure 5 provides a visual illustration of this increase in development intensity by comparing current conditions on two different lakes – Lake Cassidy at the current 0.371 level and Lake Martha (north) at close to a 0.5 level (0.464). Five new docks are also expected in the Rural Conservancy Reach.

Lake Cassidy’s Natural reach along the north and east shorelines is forecast to have an additional 5 primary structures and 2 new docks resulting in only a minute change in the development intensity for this reach. This Natural area extends north and encompasses a significant wetland area.



Lake Cassidy:  
Development  
intensity in the  
Rural Conservancy  
is 0.371 primary  
structures per acre.



Lake Martha  
(north county) has  
a development  
intensity of 0.464  
primary structures  
per acre.

**Figure 5.** Comparison of Development Intensity – Lake Cassidy and Lake Martha (north)

### ***Lake Reaches Ranked as “Low” for Potential Future Development***

“Low” reaches are those that are expected to have one or fewer new primary structures expected over the planning period. There were 17 lake shoreline reaches that fell into this category. All of these lakes are identified in Table 5. The low reaches have the most dramatic size range of any of the three categories and are between 32 acres to 2546 acres. They contain between 1 and 16 parcels. The shorelands for the “low” lake reaches are designated Rural Conservancy, Resource or Natural. Lakes with a “low” rank for potential future impacts are in a largely natural condition with intact ecological functions. The shoreline environment management policies and regulations in the SMP will limit the allowed uses around these lakes and ensure that the existing ecological functions remain intact. Limited infrastructure and road access in these areas will also help to keep development pressure low.

**Table 5. Lake Reaches Ranked as “Low” for Potential Future Development**

<b>LAKES</b>			<b>Forecast of Potential Impacts</b>					<b>Development Intensity</b>	
<b>Reach ID</b>	<b>Water Name</b>	<b>Environment Designation</b>	<b>New Primary Structures</b>	<b>New Impervious Surface (acres)</b>	<b>New Vegetation Clearing (acres)</b>	<b>Parcels w/ new armoring</b>	<b>New Docks</b>	<b>Primary Structures per acre (existing)</b>	<b>Primary Structures per acre (new)</b>
111	Woods	Natural	1	0.08	0.10	n/a	0	0.000	0.003
70	Bryant	Natural	1	0.07	0.09	n/a	1	0.055	0.063
97	Riley	Rural Conservancy	1	0.07	0.09	n/a	0	0.013	0.025
76	Crystal	Natural	1	0.05	0.06	n/a	1	0.033	0.035
106	Swartz	Natural	1	0.05	0.06	n/a	1	0.125	0.145
90	Little	Natural	0	0.02	0.03	n/a	0	0.000	0.000
72	Chain	Natural	0	0.00	0.00	n/a	1	0.000	0.000
77	Dagger	Resource	0	0.00	0.00	n/a	1	0.004	0.004
78	Echo	Natural	0	0.00	0.00	n/a	1	0.000	0.000
80	Frontal	Resource	0	0.00	0.00	n/a	1	0.000	0.000
83	Hannan	Natural	0	0.00	0.00	n/a	1	0.002	0.002
87	Kellogg	Natural	0	0.00	0.00	n/a	0	0.000	0.000
94	Mud	Natural	0	0.00	0.00	n/a	0	0.000	0.000
96	Purdy	Natural	0	0.00	0.00	n/a	1	0.000	0.000
107	Tomtitt	Natural	0	0.00	0.00	n/a	0	0.000	0.000
108	Twin (north&south)	Resource	0	0.00	0.00	n/a	0	0.000	0.000
110	Wallace	Natural	0	0.00	0.00	n/a	0	0.000	0.000

### ***Potential Cumulative Impacts***

These results indicate that the majority of the future development along lakes will consist of infill in already modified lake shoreline areas. This could result in the following types of impacts to shoreline ecological function:

- Vegetation: Continued decrease in shoreline vegetation as clearing for new construction continues. Removal of shoreline vegetation impacts bank stability, nutrient exchange, pollution removal, surface and subsurface water movement, upland habitat, in-water habitat and large woody debris recruitment; and water temperature;

- Water movement: Further impairment of water movement and hydrologic function associated with shoreline armoring, docks, and ramps. Hyporheic exchange is impacted and natural beach conditions are altered by disruptions to wave action and sediment deposition;
- Water Quality: Increase in runoff and associated water quality impacts with the creation of new impervious surfaces for residential use. Impervious surface increases the rate and volume of stormwater runoff accelerating erosion and the transport of pollutants. Fluctuations in water levels impact vegetation and habitat along the water's edge. Impervious surface also reduces infiltration and groundwater supply;
- Habitat: Potential loss of or disturbance to riparian or associated wetland habitat during residential construction and use; potential damage to aquatic habitat via runoff and increased recreational use.

However, the types of development that will likely occur along lake shorelines will typically be more heavily regulated under the Proposed Program. For example, 45 acres of lakefront shoreline area that are currently designated as Rural would be designated as Natural under the Proposed Program. This designation change will impose greater restrictions in such areas by prohibiting most types of docks, piers and permanent moorage. In addition, there are greater limitations upon the grading and clearing that can be performed on these parcels (SCC 30.67.515, 30.67.570 and 30.67.599). Such restrictions will further help to maintain the "no net loss" standard even as development continues over the next 10 years. While this designation change applies to only a very small percent of all lake shoreline area, the change in regulatory oversight is typical of many of the designation changes under the Proposed Program.

Several lakes outside of urban growth areas are proposed to be changed from a Suburban designation to Rural Conservancy. Future development along lake shorelines, in most cases, is expected to be related to single-family development: houses, accessory structures and private docks, and shoreline modifications including fill and vegetation removal associated with new home construction and new or replacement bulkheads where existing homes may need shoreline stabilization.

- Single-family homes are a preferred shoreline use and will continue to be permitted. New homes and accessory structures will be subject to a 150-foot buffer requirement under the proposed SMP, however, exceptions are allowed for development on existing small lots. These provisions are more restrictive than the 25-foot setback required under the existing program.
- Docks will continue as a permitted use but under the proposed program, shared or community facilities are encouraged and new docks must adhere to locational, design and materials standards to mitigate for potential impacts to habitat and water quality.
- The use of fill is permitted in the Suburban environment under the current program. The proposed program allows fill as well, but requires a conditional use permit for any fill proposed below the OHWM.
- New or replacement bulkheads are currently allowed. Under the proposed program, new bulkheads would only be allowed to protect existing primary structures. New and replacement bulkheads would be subject to locational criteria and construction standards.

- For residential development, disturbance of natural vegetation should be the minimum necessary.

The specific regulatory and non-regulatory measures that are anticipated to offset the potential impacts are described further in Section 4.0.

### 3.1.2 Marine Shorelines

#### **Existing Conditions**

Snohomish County marine shorelines lie along Admiralty Inlet and the Central Basin of Puget Sound. The majority (78 percent) of marine shoreline areas is residential, followed by resource production (7 percent) and undeveloped land (7 percent). The regulated marine shoreline area above the ordinary high water mark totals 2,849 acres. The area north of Stanwood adjacent to Skagit Bay is currently designated Conservancy and the adjacent inland floodplain area is designated Rural. The shorelands from above the Stillaguamish floodplain southward to Tulalip are predominantly designated Suburban as is Hat Island. The Picnic Point area is designated Conservancy and Point Wells is designated Urban.



**Figure 6.**

Over 35 miles, or an estimated 80% of the County's marine shoreline is armored by bulkheads and/or railroad tracks.

*(Photo credit: Washington State Dept. of Ecology, Washington Coastal Atlas, 2006)*

#### **Proposed Conditions**

Under the Proposed Program, the total regulated marine shoreline consists of 9 individual reaches. As with the other reach types, some individual reaches contain areas that fall under more than one waterbody/shoreline type. For example, reaches with associated wetland areas or along tidally influenced areas at the confluence of rivers or streams would contain both marine and river/stream shoreline areas. These river estuaries have been included in the "Rivers" section of the analysis.

The area north of Stanwood adjacent to Skagit Bay is proposed to be switched to a Resource designation with a relatively small wedge of Rural on the eastward edge of the floodplain. The shorelands from above the Stillaguamish floodplain southward to Tulalip are proposed to be changed to Rural Conservancy, as is Hat Island. The Picnic Point area is proposed to be re-designated Urban with Point Wells proposed to keep its Urban designation.



### Foreseeable Future Development

In terms of shoreline length stretching from the Stillaguamish floodplain all the way south to the County line, the most common proposed environment designations along marine shoreline reaches are Rural Conservancy and Urban. Given the expected uses of such areas, it is anticipated that marine shoreline areas will experience the following types of development over the next 10 years:

- Infill in developed marine shoreline residential areas, which would include armoring, view corridor tree removal and trimming, vegetation clearing, etc.
- New or expanded shoreline armoring associated with residential marine use.
- Creation of more parks/public access sites.
- Urban re-development at Point Wells

Calculations of foreseeable future development along marine shorelines indicate that areas most likely to exhibit the greatest development over the duration of the planning period fall within highly developed areas (Table 6). As described in the methods section (Section 2.0, Number 3), the calculations of foreseeable future development use one variable – the number of primary structures - as an indicator of overall development impact. It is assumed that construction and use of new primary structures will result in the types of activities that could directly impact shoreline function – vegetation clearing, creation of new impervious surfaces, shoreline modifications, increased runoff, etc. Table 6 shows the rankings for all nine of the County's marine shoreline reaches.

**Table 6. Rankings for Marine Shoreline Reaches**

MARINE			Forecast of Potential Impacts					Development Intensity	
Reach ID	Water Name	Environment Designation	New Primary Structures	New Impervious Surface (acres)	New Vegetation Clearing (acres)	Parcels w/ new armoring	New Docks	Primary Structures per acre (existing)	Primary Structures per acre (new)
67	Point Wells	Urban	323	23.39	29.71	0	n/a	0.018	5.693
65	Hat Island	Rural Conservancy	70	5.03	6.39	4	n/a	0.743	1.057
62	Skagit Bay	Urban	66	4.79	6.09	1	n/a	0.016	1.103
64	Tulalip	Rural Conservancy	54	3.88	4.93	5	n/a	0.709	0.800
63	Port Susan	Rural Conservancy	37	2.71	3.44	3	n/a	0.568	0.628
66	Picnic Point	Urban	11	0.80	1.01	0	n/a	0.328	0.387
62	Skagit Bay	Rural Conservancy	7	0.50	0.64	0	n/a	0.042	0.071
62	Skagit Bay	Resource	2	0.11	0.15	0	n/a	0.015	0.015
63	Port Susan	Natural	0	0.00	0.00	0	n/a	0.015	0.015
High (20 +)			Moderate (2-19)				Low (0-1)		

- **Point Wells:** Point Wells is located on Puget Sound just north of the King-Snohomish County line. While we cannot predict with certainty what the ultimate development potential of this site will be, it is a safe to assume that Point Wells will remain the most intensely developed marine reach in the County. Point Wells is currently a developed industrial site. Redevelopment of any type will require prior clean-up and remediation of the site. (See Figure 7).

Based only on the acreage and a minimum lot size of 7,200 square feet, this site could be redeveloped into 615 new primary structures, although it should be noted that some development proposals have indicated much higher numbers. The forecast model has further reduced this building potential to 323 new primary structures assuming that full build out would not occur during the planning period. Given the economics of this site, including the land values, the clean-up costs and the extraordinary location, the development potential would need to be much higher to recoup the necessary investment. In spite of such high development potential, redevelopment of Point Wells could result in an overall improvement of the ecological conditions and public access furthering the goals of the Shoreline Management Act.

Redevelopment of this site would focus on restoration rather than preservation of existing ecological functions. This site would benefit from removal of the existing structures and shoreline modifications and restoration of estuarine wetlands and shoreline vegetation.



**Figure 7.**  
Point Wells

*(Photo credit:  
Washington  
State Dept. of  
Ecology,  
Washington  
Coastal Atlas,  
2006)*



- **Hat Island:** The shoreline jurisdictional area on Hat Island includes 401 parcels, 165 of which contain primary structures. The island has 266 waterfront parcels, of which 109 contain primary structures with 73% of these waterfront structures protected by armoring. The island also has a marina (see Figure 8). Over half of the parcels in the island's shoreline jurisdiction are vacant. Since the island is accessible by passenger-only ferry, development on the island poses some challenges and additional expense. Equipment, materials and motor vehicles must be delivered to the island by barge.

The forecast model predicts that 70 new structures may be built over the planning period and that four existing primary structures may need to add armoring. The proposed SMP allows new armoring only to protect existing structures. New primary structures must be located such that new armoring will not be necessary. This restriction may limit future beachfront and bluff construction and reduce the overall amount of new construction below forecast levels. The forecast did not produce a prediction for new docks on the island but it is clear from current permit activity that some parcels on the island are inaccessible by road and landowners have submitted applications for new docks. Given construction challenges on the island posed both by access and by tidal and beach processes, new dock construction is not expected to occur in significant numbers.

There are many ecological processes occurring on Hat Island and existing development has resulted in impairment of many of these functions: littoral drift and beach nourishment has been disrupted by bulkheads, a marina, docks and groin fields; intertidal wetlands have been filled and cut off from marine waters; shoreline and bluff-top vegetation has been removed; and pollutant discharge has resulted in contaminated sediments. Impacts of future development could be reduced by utilizing non-structural solutions such as setbacks and native vegetation.



**Figure 8.**  
Hat Island  
Marina

*(Photo credit:  
Washington  
State Dept. of  
Ecology,  
Washington  
Coastal Atlas,  
2006)*



**Figure 9.**  
Feeder bluffs  
and  
waterfront  
development  
on Hat Island.

*(Photo credit:  
Washington  
State Dept. of  
Ecology,  
Washington  
Coastal Atlas,  
2006)*

- **Skagit Bay:** Skagit Bay is proposed to be divided into three shoreline environment designations: Urban, Rural Conservancy and Resource. The area is largely devoted to farming with a small amount of rural residential and overlap into the Stanwood UGA. Most of the area is included in the 100-year floodplain. The forecast model predicts a total of 75 new primary structures over the planning period. Most of the development potential (66 lots) exists on a single upland property inside the UGA and located well inland from the Stillaguamish River and Skagit Bay.

Modifications – armoring, dikes, fill - in this area have impacted hyporheic functions, floodplain connectivity, channelized stream flows and filled estuarine and backshore wetlands. New development should be located and designed such that further modifications are not necessary. Restoration efforts to reconnect off-channel and estuarine habitat could be considered to help offset impacts from new development.

- **Tulalip:** This reach includes only non-tribal lands along the coast of the Tulalip Reservation. These non-tribal areas are developed for residential use with associated shoreline modifications including armoring, docks, stairs and trams (see Figures 10 and 11). There are 493 waterfront parcels along this coastline and of these, 354 contain primary structures with 312 of these being armored. The forecast model predicts an additional 54 new primary structures and new armoring for 5 existing structures. Because of steep slope hazards and limitations on armoring to protect new structures, the actual development potential may be lower than what is predicted by the model. Restrictions on rural cluster subdivisions in the RRT-10 zone on the Tulalip Reservation may further reduce the development potential from predicted levels.

New development should utilize non-structural solutions to preserve shoreline functions and protect structures: feeder bluffs, littoral drift and shoreline vegetation need to be preserved.





**Figure 10.** Stairs and beach armoring on Mission Beach, Tulalip. (Photo credit: Washington State Dept. of Ecology, Washington Coastal Atlas, 2006)



**Figure 11.** Priest Point, Tulalip. (Photo credit: Washington State Dept. of Ecology, Washington Coastal Atlas, 2006)

Development and armoring have affected natural sediment processes and disconnected backshore wetlands from saltwater. Possession Sound is on the Department of Ecology's 303d list for contaminated sediments. New development should be located and designed such that further modifications are not necessary. Restoration efforts to reconnect off-channel and estuarine habitat could be considered to help offset impacts from new development. New development should manage impervious surface, shoreline vegetation, wetlands, stormwater runoff and on-site sewage systems to reduce contamination potential.

- **Port Susan:** The Port Susan area is located along Puget Sound north of the Tulalip Reservation and south of the Stillaguamish floodplain. Average lot size is less than 1 acre and 85% of the 345 waterfront parcels contain primary structures, of which 91% are armored. This area relies on groundwater and on-site septic systems. Port Susan and streams flowing into Port Susan in the Warm Beach vicinity are on the state Department of Ecology's 303d list for fecal coliforms. (See Figure 12). The forecast model predicts another 37 new primary structures during the planning period and new armoring for three existing structures. Kayak Point Park provides public access to the shoreline.

Development and armoring have affected natural sediment processes. Bulkheads alter the forces from waves resulting in scour of beach sediments. Note in Figure 12 how bulkheads have been installed to protect property resulting in the need to add groins to trap sand. New development should utilize non-structural solutions to preserve shoreline functions and protect structures: feeder bluffs, littoral drift and shoreline vegetation need to be preserved. Public education regarding maintenance of on-site sewage systems and animal waste removal may help improve water quality.



**Figure 12.** Warm Beach, Port Susan area.



- **Picnic Point:** The Picnic Point area is located along the shores of Puget Sound between Edmonds and Mukilteo. For an urban area, development along this shoreline is relatively sparse. The average lot size is over 1 acre and less than half of the waterfront lots are developed (25 of 58). The entire shoreline is armored by the railroad tracks and typically flanked by high banks. The forecast model used for the Urban Growth Areas predicts only 11 new primary structures in this shoreline reach. Public access is available at Picnic Point (Figure 13) and Meadowdale Beach Park.

Development along this area may ultimately be setback a fair distance from the shoreline due to railroad right-of-way and steep, unstable bluffs. Preserving vegetation and appropriate setbacks will help to stabilize the bluffs. Natural beach processes and public access are both limited by the railroad tracks.



**Figure 13. Picnic Point**

*(Photo credit: Washington State Dept. of Ecology, Washington Coastal Atlas, 2006)*

### ***Potential Cumulative Impacts***

These results indicate that the majority of the future development along marine shorelines will consist of continued residential development and some agricultural use within areas that have a range of

current development conditions. This could result in the following types of impacts to shoreline ecological function:

- Vegetation: A potentially substantial decrease in shoreline vegetation in relatively unmodified areas; continued loss of riparian vegetation in heavily modified areas.
- Water Movement: Continued armoring of the marine shoreline will further restrict sediment flows and water movement.
- Water Quality: Increase in runoff and associated water quality impacts due to increased residential use and impervious surface area, as well as continued agricultural use.
- Habitat: Potential loss of or disturbance to riparian habitat during clearing for residential use.

While it is assumed that there will be some infill and expansion in already modified marine shoreline areas, the types of development that will occur will typically be more heavily regulated under the Proposed Program. For example, for agricultural areas along marine shorelines area that would change from a Rural designation under the existing program to a Resource designation under the Proposed Program, any type of breakwater, jetty or groin would no longer be permitted outright. Under this new designation, any such in-water structure would require site-specific approval by County and state permitting authorities (SCC 30.67.520(c)). While this specific example represents only a small area (68 acres, or less than 1 percent of all proposed Resource lands under the proposed SMP), this type of increased review and oversight of shoreline activities would be required in many of the proposed designation changes under the proposed SMP (SCC 30.67.430).

However, in some cases, the proposed SMP might allow for greater and more flexible types of marine shoreline development. For example, approximately 273 acres of marine shoreline would change designation under the Proposed Program from Conservancy to Rural Conservancy. This area represents more than half (69.6 percent) of all the proposed Rural Conservancy marine shoreline area (Snohomish County 2009a). This shift in designation would result in changes to the requirements for some shoreline modifications along marine areas:

- Marinas would continue to be a conditional use, but standards under the proposed SMP are more sensitive to ecological functions;
- Docks and piers would continue to be permitted uses but location and design standards and construction material provisions are more sensitive to ecological functions;
- Bulkheads and other structural bank stabilization or flood protection measures would shift from a permitted use to a conditional use requiring geotechnical analysis and mitigation for any impaired functions;
- Boat launches and ramps would shift from a conditional use to a permitted use but standards under the proposed SMP require compliance with the no net loss standard for ecological functions ; and
- Under the current program, fill is not allowed within 100 feet of the OHWM within the Conservancy environment but otherwise permitted. Under the proposed SMP, fill is permitted in the Rural Conservancy and conditional in the Aquatic.

None of these shoreline modifications would be allowed in critical saltwater habitats. The specific regulatory and non-regulatory measures that are anticipated to offset the potential impacts are described further in Section 4.0.



### 3.1.3 Rivers

River reach impacts are organized by watershed. Reach ID number corresponds to the reach data in Section 5.0 – refer to the tables in Section 5.0 for location and geographic description of the reach.

#### ***Existing Conditions***

Four main river basins lie within Snohomish County:

- Stillaguamish: 700 square miles in total area, most of it within Snohomish County. The basin contains 2,198 total miles of rivers and streams. Land use is largely forestry (76 percent) and rural (17 percent). Much of the reach has relatively poor aquatic habitat, but there is some suitable Chinook spawning habitat in the lower reaches (Snohomish County 2009a). The lower reaches provide large areas of waterfowl habitat
- Snohomish: 1,856 square miles in total area, most of which is in King County, includes Skykomish subbasin. Land use within the Snohomish County portion of this basin is again dominated by forestry. Upstream spawning habitat is much more abundant, and the lower reaches provide large areas of waterfowl habitat (Snohomish County 2009a).
- Lake Washington: 692 square miles in total area, 183 square miles of which lie in Snohomish County. This is the most highly urbanized of the four basins, with 25 percent of the basin land use devoted to commercial and another 25 percent to low-density residential land use (Snohomish County 2009a).
- Skagit: 44 miles of shoreline within Snohomish County. This basin is dominated by aquatic areas and lowland conifer forest and is largely undeveloped (Snohomish County 2009a).

Most of the 70,444 acres of existing river/stream shoreline area (46,348 acres, or 66.8 percent) currently has an environmental designation of Rural.

#### ***Proposed Conditions***

The total regulated river/stream shorelines under the Proposed Program consist of 195 individual rivers and streams. As with the other reach types, some individual reaches contain areas that fall under more than one waterbody type. The Proposed Program includes 1,923 acres of river/stream shoreline area that are currently not regulated as shoreline, for a total regulated area of 72,367 acres of river/stream shoreline. Under the Proposed Program environment designations, 39% of the newly regulated river/stream shoreline area would fall under the designation of Rural Conservancy and 50% would be designated Resource.

#### ***Foreseeable Future Development***

Nearly 90% of the river/stream shoreline areas are proposed to be designated as Rural Conservancy or Resource. Given the expected uses of such areas, it is anticipated that river shoreline areas will experience the following types of development over the next 10 years:

- Additional residential development within existing pockets of residential uses, which would include armoring, view corridor tree removal and trimming, vegetation clearing, etc.
- Continued expansion of agricultural and forest resource-based uses

- More parks/public access sites

Calculations of foreseeable future development along river/stream shorelines indicate that areas most likely to exhibit the greatest development over the planning period are those that already possess some degree of development – either from agricultural or residential development. As described in the methods section (Section 2.0, Number 3), calculations of foreseeable future development use one variable – the number of primary structures - as an indicator of overall development impact. It is assumed that construction and use of new primary structures will result in the types of activities that could directly impact shoreline function – vegetation clearing, creation of new impervious surfaces, shoreline modifications, increased runoff, etc.

New docks are not expected to be built along river shorelines as accessory structures for residential development. Because of river dynamics, flooding, and the transport of boats and floating debris, docks on rivers are not practical. Because it is extremely unusual to see docks along river shorelines, the model does not include calculations for any foreseeable future development. However, new docks could potentially be developed along the slow moving sloughs or backwaters in the lower reaches of the Snohomish or Stillaguamish rivers. If docks were to be developed, this would most likely occur in conjunction with public recreational uses similar to Langus Riverfront Park in the City of Everett.

Predictions for future armoring are based on the number of parcels within the reach that are currently not armored and that already have existing primary structures. The model does not consider the erosion rates along the river banks or the relative risk of each of the existing structures. Heavily parcelized reaches show a greater potential for needing new armoring to protect existing structures, as allowed under the shoreline guidelines. The model merely predicts the potential demand for bank armoring given the number of existing structures and growth rates within urban and rural areas. The regulations in the proposed SMP will limit the construction of structural features in favor of non-structural options for bank stabilization. New armoring is only allowed to protect existing structures.

Table 7 identifies the river reaches ranked as “High”, “Moderate” and “Low” for potential development impacts. The table is arranged by watershed to give a clearer indication of location.

<b>High (20 +)</b>	<b>Moderate (2-19)</b>	<b>Low (0-1)</b>
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**Table 7. Potential Future Development for River Reaches by Watershed**

RIVERS			Forecast of Potential Impacts					Development Intensity	
Reach ID	Water Name	Environment Designation	New Primary Structures	New Impervious Surface (acres)	New Vegetation Clearing (acres)	Parcels w/ new armoring	New Docks	Primary Structures per acre (existing)	Primary Structures per acre (new)
<b>Lake Washington Watershed</b>									
61	Swamp Creek	Urban	79	5.71	7.25	47	n/a	1.027	1.556
59	Little Bear Creek	Rural Conservancy	2	0.11	0.15	2	n/a	0.171	0.186
60	North Creek	Urban	2	0.11	0.14	1	n/a	0.478	0.547
59	Little Bear Creek	Urban	0	0.00	0.00	7	n/a	0.083	0.083
<b>Skagit River Watershed</b>									
58	Sauk	Rural Conservancy	71	5.12	6.50	16	n/a	0.041	0.076
58	Sauk	Natural	15	1.08	1.38	2	n/a	0.018	0.032
58	Sauk	Urban	2	0.15	0.19	0	n/a	0.000	0.024
58	Sauk	Resource	0	0.02	0.03	0	n/a	0.000	0.001
58	Sauk	Urban Conservancy	0	0.00	0.00	1	n/a	0.008	0.008
<b>Snohomish River Watershed</b>									
51	Sultan River/ Marsh Creek	Urban	109 *	7.87	10.00	24	n/a	0.411	0.984
50	SF Skykomish	Rural Conservancy	104	7.53	9.56	23	n/a	0.737	1.107
52	Woods Creek	Rural Conservancy	99	7.13	9.05	16	n/a	0.076	0.127
55	Pilchuck River/ Little Pilchuck	Rural Conservancy	89	6.42	8.15	27	n/a	0.106	0.141
56	Pilchuck River	Rural Conservancy	75	5.44	6.91	20	n/a	0.115	0.160
55	Pilchuck River/ Little Pilchuck	Urban	58	4.18	5.31	13	n/a	0.221	0.894
36	Skykomish/ Wallace/Elwell/ McCoy	Resource	52	3.78	4.79	6	n/a	0.033	0.048
53	WF Woods / Carpenter Creek	Rural Conservancy	48	3.48	4.42	11	n/a	0.043	0.066
30	Snohomish	Resource	45	3.27	4.16	0	n/a	0.019	0.027
51	Sultan River/ Marsh Creek	Urban Conservancy	42 *	3.00	3.82	23	n/a	0.336	0.685
54	Pilchuck River/ Dubuque	Rural Conservancy	38	2.71	3.45	11	n/a	0.136	0.166
29	Quilceda Creek	Urban Conservancy	37	2.66	3.38	86	n/a	1.036	1.305
49	Skykomish/NF Sky./ Deer Creek	Rural Conservancy	34	2.49	3.16	11	n/a	0.110	0.149
45	Skykomish	Rural Conservancy	23	1.67	2.12	13	n/a	0.254	0.287
54	Pilchuck River/ Dubuque	Resource	23	1.65	2.09	9	n/a	0.283	0.316
36	Skykomish/ Wallace/Elwell/ McCoy	Rural Conservancy	18	1.33	1.69	1	n/a	0.047	0.072
35	Skykomish	Resource	18	1.28	1.63	4	n/a	0.052	0.058
34	Snoqualmie	Resource	16	1.15	1.46	1	n/a	0.016	0.023

39	Skykomish/ Wallace	Rural Conservancy	16	1.15	1.46	2	n/a	0.584	0.725
43	May Creek	Rural Conservancy	13	0.92	1.17	4	n/a	0.109	0.134
34	Snoqualmie	Rural Conservancy	12	0.90	1.15	1	n/a	0.054	0.092
33	Snohomish	Resource	11	0.77	0.98	2	n/a	0.021	0.027
44	Wallace/NF Wallace	Rural Conservancy	10	0.73	0.93	2	n/a	0.020	0.033
39	Skykomish/ Wallace	Resource	10	0.71	0.90	3	n/a	0.025	0.031
51	Sultan River/ Marsh Creek	Rural Conservancy	8	0.60	0.77	3	n/a	0.091	0.119
56	Pilchuck River	Urban	7	0.49	0.63	1	n/a	0.103	0.339
33	Snohomish	Rural Conservancy	6	0.47	0.60	2	n/a	0.059	0.070
43	May Creek	Urban	6	0.46	0.58	29	n/a	2.022	2.162
32	Snohomish/ French Creek	Resource	6	0.41	0.52	1	n/a	0.018	0.019
31	Snohomish	Resource	5	0.39	0.49	0	n/a	0.018	0.019
49	Skykomish/NF Sky./ Deer Creek	Resource	5	0.34	0.44	3	n/a	0.162	0.188
48	Skykomish	Rural Conservancy	5	0.33	0.42	1	n/a	0.031	0.049
32	Snohomish/ French Creek	Rural Conservancy	5	0.33	0.41	0	n/a	0.039	0.043
35	Skykomish	Rural Conservancy	4	0.32	0.41	0	n/a	0.033	0.048
30	Snohomish	Rural Conservancy	4	0.32	0.41	0	n/a	0.211	0.226
52	Woods Creek	Resource	4	0.30	0.39	7	n/a	0.031	0.033
31	Snohomish	Rural Conservancy	4	0.30	0.38	2	n/a	0.363	0.393
29	Quilceda Creek	Rural Conservancy	3	0.19	0.25	2	n/a	0.143	0.169
57	Pilchuck River	Resource	2	0.16	0.20	0	n/a	0.000	0.000
40	Wallace/Bear/ May	Urban	2	0.15	0.19	1	n/a	2.800	3.010
33	Snohomish	Natural	1	0.06	0.07	0	n/a	0.000	0.001
38	McCoy Creek	Resource	1	0.05	0.07	0	n/a	0.002	0.003
47	Proctor Creek	Rural Conservancy	1	0.05	0.06	1	n/a	0.004	0.004
45	Skykomish	Resource	1	0.05	0.06	2	n/a	0.026	0.027
37	Elwell/Youngs Creek	Resource	1	0.05	0.06	1	n/a	0.001	0.001
53	WF Woods / Carpenter Creek	Resource	0	0.02	0.03	0	n/a	0.001	0.001
49	Skykomish/NF Sky./ Deer Creek	Natural	0	0.02	0.03	0	n/a	0.000	0.002
55	Pilchuck River/ Little Pilchuck	Natural	0	0.02	0.03	0	n/a	0.025	0.033
34	Snoqualmie	Natural	0	0.00	0.00	0	n/a	0.000	0.000
32	Snohomish/ French Creek	Urban Conservancy	0	0.00	0.00	1	n/a	0.059	0.059
31	Snohomish	Natural	0	0.00	0.00	0	n/a	0.000	0.000
31	Snohomish	Urban	0	0.00	0.00	0	n/a	0.143	0.143
31	Snohomish	Urban Conservancy	0	0.00	0.00	0	n/a	0.364	0.364
30	Snohomish	Natural	0	0.00	0.00	0	n/a	0.002	0.002
30	Snohomish	Urban	0	0.00	0.00	2	n/a	0.010	0.010
51	Sultan River/ Marsh Creek	Resource	0	0.00	0.00	1	n/a	0.001	0.001

50	SF Skykomish	Resource	0	0.00	0.00	0	n/a	0.000	0.000
48	Skykomish	Resource	0	0.00	0.00	0	n/a	0.002	0.002
47	Proctor Creek	Resource	0	0.00	0.00	0	n/a	0.000	0.000
46	Duffey Creek	Rural Conservancy	0	0.00	0.00	0	n/a	0.000	0.000
44	Wallace/NF Wallace	Resource	0	0.00	0.00	0	n/a	0.001	0.001
43	May Creek	Resource	0	0.00	0.00	0	n/a	0.000	0.000
42	Olney Creek	Resource	0	0.00	0.00	0	n/a	0.000	0.000
41	Bear Creek	Resource	0	0.00	0.00	0	n/a	0.000	0.000
40	Wallace/Bear/May	Resource	0	0.00	0.00	0	n/a	0.000	0.000
38	McCoy Creek	Rural Conservancy	0	0.00	0.00	1	n/a	0.008	0.008
37	Elwell/ Youngs Creek	Rural Conservancy	0	0.00	0.00	0	n/a	0.002	0.002
35	Skykomish	Natural	0	0.00	0.00	0	n/a	0.004	0.004
35	Skykomish	Urban	0	0.00	0.00	0	n/a	0.000	0.000
56	Pilchuck River	Natural	0	0.00	0.00	0	n/a	0.000	0.000
55	Pilchuck River/Little Pilchuck	Resource	0	0.00	0.00	0	n/a	0.500	0.500
55	Pilchuck River/Little Pilchuck	Urban Conservancy	0	0.00	0.00	1	n/a	0.250	0.250
54	Pilchuck River/Dubuque	Urban Conservancy	0	0.00	0.00	0	n/a	0.074	0.074
<b>Stillaguamish River Watershed</b>									
25	SF Stillaguamish	Rural Conservancy	104	7.53	9.56	40	n/a	0.243	0.294
26	Canyon Creek	Rural Conservancy	103	7.46	9.48	28	n/a	0.615	0.795
22	SF Stillaguamish	Urban Conservancy	79	5.74	7.29	1	n/a	0.006	0.522
27	SF Stillaguamish	Rural Conservancy	74	5.37	6.82	17	n/a	0.104	0.147
4	Pilchuck Creek	Rural Conservancy	43	3.08	3.91	5	n/a	0.045	0.081
16	NF Stillaguamish	Rural Conservancy	42	3.01	3.82	12	n/a	0.126	0.166
23	Jim Creek	Rural Conservancy	41	2.93	3.72	11	n/a	0.050	0.072
2	Stillaguamish River / Upper Portage Creek	Urban Conservancy	41	2.93	3.72	0	n/a	0.051	0.737
13	NF Stillaguamish	Rural Conservancy	37	2.71	3.44	5	n/a	0.067	0.105
3	Church Creek	Urban	31	2.24	2.85	1	n/a	0.037	0.612
1	Stillaguamish River / Lower Portage Creek	Resource	23	1.67	2.12	6	n/a	0.026	0.029
2	Stillaguamish River / Upper Portage Creek	Rural Conservancy	18	1.30	1.65	7	n/a	0.095	0.120
2	Stillaguamish River / Upper Portage Creek	Resource	15	1.10	1.39	1	n/a	0.032	0.038
1	Stillaguamish River / Lower Portage Creek	Rural Conservancy	12	0.90	1.15	10	n/a	0.124	0.137
19	NF Stillaguamish	Rural Conservancy	12	0.85	1.08	2	n/a	0.068	0.108
3	Church Creek	Rural	11	0.82	1.04	1	n/a	0.050	0.114



		Conservancy							
6	NF Stillaguamish	Rural Conservancy	11	0.78	0.99	3	n/a	0.022	0.028
8	NF Stillaguamish	Resource	10	0.71	0.91	3	n/a	0.036	0.042
11	NF Stillaguamish	Resource	9	0.63	0.80	7	n/a	0.092	0.102
8	NF Stillaguamish	Rural Conservancy	7	0.51	0.64	0	n/a	0.022	0.044
21	Ashton Creek	Rural Conservancy	7	0.48	0.61	1	n/a	0.091	0.212
20	Squire Creek	Rural Conservancy	7	0.48	0.61	2	n/a	0.110	0.159
18	Segelson Creek	Rural Conservancy	5	0.36	0.46	1	n/a	0.056	0.112
6	NF Stillaguamish	Resource	5	0.36	0.46	3	n/a	0.029	0.032
22	SF Stillaguamish	Rural Conservancy	5	0.36	0.45	2	n/a	0.078	0.094
5	Anderson Creek	Rural Conservancy	5	0.33	0.42	2	n/a	0.062	0.081
7	Grant Creek	Rural Conservancy	4	0.32	0.41	0	n/a	0.049	0.122
9	Deer Creek	Resource	4	0.27	0.35	2	n/a	0.028	0.034
11	NF Stillaguamish	Rural Conservancy	4	0.27	0.34	0	n/a	0.023	0.045
22	SF Stillaguamish	Resource	3	0.24	0.31	2	n/a	0.027	0.031
10	Brooks Creek	Rural Conservancy	3	0.21	0.27	0	n/a	0.043	0.074
9	Deer Creek	Rural Conservancy	2	0.18	0.22	0	n/a	0.053	0.079
5	Anderson Creek	Resource	2	0.16	0.20	1	n/a	0.018	0.021
17	French Creek	Rural Conservancy	2	0.14	0.17	1	n/a	0.053	0.073
22	SF Stillaguamish	Urban	2	0.11	0.14	0	n/a	0.000	0.083
15	Boulder River	Rural Conservancy	1	0.07	0.09	0	n/a	0.070	0.092
23	Jim Creek	Resource	1	0.07	0.09	0	n/a	0.003	0.003
14	Rollins Creek	Rural Conservancy	1	0.05	0.06	0	n/a	0.000	0.012
13	NF Stillaguamish	Resource	1	0.05	0.06	0	n/a	0.003	0.004
20	Squire Creek	Natural	0	0.03	0.04	1	n/a	0.004	0.004
15	Boulder River	Natural	0	0.02	0.03	0	n/a	0.000	0.000
12	Montague Creek	Resource	0	0.02	0.03	0	n/a	0.002	0.002
10	Brooks Creek	Resource	0	0.02	0.03	0	n/a	0.000	0.001
7	Grant Creek	Resource	0	0.02	0.03	0	n/a	0.001	0.002
27	SF Stillaguamish	Natural	0	0.02	0.03	0	n/a	0.000	0.000
4	Pilchuck Creek	Resource	0	0.00	0.00	0	n/a	0.002	0.002
21	Ashton Creek	Natural	0	0.00	0.00	0	n/a	0	0.000
19	NF Stillaguamish	Resource	0	0.00	0.00	0	n/a	0.000	0.000
18	Segelson Creek	Resource	0	0.00	0.00	0	n/a	0.000	0.000
17	French Creek	Resource	0	0.00	0.00	0	n/a	0.001	0.001
16	NF Stillaguamish	Resource	0	0.00	0.00	0	n/a	0.000	0.000
14	Rollins Creek	Resource	0	0.00	0.00	0	n/a	0.000	0.000
12	Montague Creek	Rural Conservancy	0	0.00	0.00	0	n/a	0.050	0.050
27	SF Stillaguamish	Resource	0	0.00	0.00	0	n/a	0.000	0.000
26	Canyon Creek	Natural	0	0.00	0.00	0	n/a	0.016	0.016
26	Canyon Creek	Resource	0	0.00	0.00	1	n/a	0.001	0.001
24	Jim Creek/ Cub Creek	Resource	0	0.00	0.00	0	n/a	0.000	0.000
High (20 +)			Moderate (2-19)			Low (0-1)			

### ***Lake Washington Watershed***

There are four creeks in Snohomish County that drain into the Lake Washington watershed which are large enough to meet the criteria as shorelines of the state: Swamp Creek, North Creek, Little Bear Creek and Cherry Creek. Only a tiny segment of Cherry Creek lies in Snohomish County and it is located in a remote forested area. Development along Cherry Creek is very unlikely and therefore it was not included in this analysis. The other three creeks are located in relatively densely developed areas.

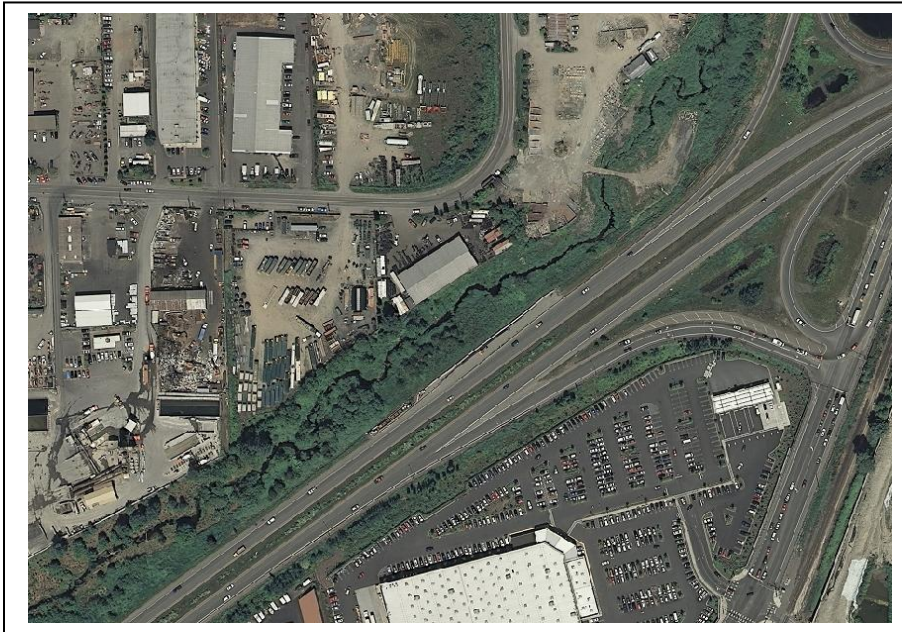
- **Swamp Creek.** The Swamp Creek corridor is developed for residential use. Over 70% of the 214 parcels already contain primary structures. In many cases structures have been built within 50 feet of the creek and riparian vegetation is sparse in many locations although the riparian area along the southern stream segment appears to be in good condition. There are numerous road and driveway crossings. Total development potential, including both vacant and re-developable lots, is estimated to be 150 new primary structures with 79 of those expected during the planning period. This expected growth will increase the development intensity from approximately 1.0 primary structure per acre to just over 1.5 primary structures per acre.

Water movement and water quality are the major functional concerns on Swamp Creek. Water flow regimes have been altered by impervious surface in the subbasin and increased stormwater runoff. The more impervious surface, the greater the volume and rate of stormwater runoff. This runoff increases the erosion potential and pollutant carrying capacity into the creek. Clearing of riparian vegetation has reduced the habitat potential and sources of large woody debris. Careful management of impervious surface, riparian vegetation, wetlands, stormwater runoff and on-site sewage systems would improve overall water quality. Stormwater management is particularly key to reducing the potential demand for new bank armoring measures. Public education regarding best management practices for yard maintenance and animal waste removal could also be beneficial.

- **North Creek.** Only a small segment of North Creek lies in unincorporated Snohomish County. The creek runs through properties containing a mobile home park and a self-storage facility. A riparian buffer of 75 – 100 feet has been maintained. The forecast model predicts that 2 new primary structures may be built during the planning period. However, this would require redevelopment of an existing home site which lies outside of the existing preserved riparian area.

North Creek's ecological conditions are similar to those of Swamp Creek. To maintain natural flow regimes, stormwater should be managed to prevent flash flows and streambed scour and pollutant contamination.

- **Little Bear Creek.** The Little Bear Creek corridor is proposed to be designated Urban where it lies inside of the Maltby UGA and Rural Conservancy outside of the UGA. The Urban portion of Little Bear Creek has been developed for industrial uses and state highway corridors for Hwy 9 and 522. The riparian corridor along this urban stream segment has been severely impacted (Figure 14). This segment has been ranked as "low" in terms of potential for new residential primary structures. However, the land capacity data used for the Growth Monitoring report (Snohomish, 2008) indicates job growth potential of 137 new jobs. An additional 436 jobs are forecast for the adjacent Brightwater site.



**Figure 14.**  
**Little Bear**  
**Creek and**  
**Hwy 522 in**  
**the Maltby**  
**UGA, 2007.**

The Rural Conservancy segments of Little Bear Creek are developed for rural residential uses. There are no rural parcels large enough to subdivide under the 5-acre zoning. Some vacant land remains where the model forecasts two new homes over the planning period. Significant wetlands in the area and reliance on on-site septic systems will likely impact the development potential. There are several ecological restoration projects in the area associated with mitigation for the Brightwater treatment plant. These wetland restoration projects in the northern reach may help to improve the water quality in Little Bear which is currently on the state Department of Ecology's 303d list for fecal coliforms.

Little Bear Creek runs through an industrial area with an extensive degree of impervious surface and major impacts to riparian vegetation. Further development in this shoreline area should focus on preserving and restoring natural flow regimes, water quality, riparian areas, wetlands and habitat.

### ***Skagit River Watershed***

This CIA has analyzed the potential development impacts along the Sauk River where it flows past the Town of Darrington northward to the Skagit/Snohomish County line. There are five proposed shoreline environment designations along this stretch of the river: Natural, Resource, Rural Conservancy, Urban and Urban Conservancy. The Sauk is a very dynamic system with actively migrating channels and strong erosional forces. Development along the banks of this river is very risky (Figures 15 and 16). The Sauk flood and erosion control plan (Snohomish, 2009c) indicates that the channel migration and erosion risk along the Sauk is at best "high" and at worst "volatile". Bank armoring is the most likely modification needed during the planning period to protect existing structures and roads.



**Figure 15. Sauk River along Hwy 530.**

*Photo Credit: WSDOT*



**Figure 16. Cabin along the Sauk River.**

Along the Sauk, numerous parcels in the analysis contain more than one environment designation. The overlap affects Rural Conservancy/Natural and Urban/Urban Conservancy forecasts resulting in double counting of potential development impacts. The forecast model predicts 71 new primary structures in the Rural Conservancy, 15 new structures in the Natural environment and 2 new structures in the Urban area. No new structures are forecast in the Resource environment. The Sauk is a Wild and Scenic River. Because of the volatile river dynamics, new development will be severely limited by restrictions in the channel migration zone and restrictions on bank armoring for new structures. Under the critical area regulations, with very limited exceptions for utilities and transportation structures, new structures are otherwise not allowed in the channel migration zone.

### ***Snohomish River Watershed***

There are 6,805 parcels in the Snohomish River Watershed that contain shoreline jurisdiction lying within the 100-year floodplain or within 200 feet of the ordinary high water mark. Approximately 3,355 of these parcels already contain primary structures. Development intensity is low with most of the shoreline jurisdiction proposed for Rural Conservancy or Resource environment designations. The forecast model predicts there will be 1,102 new primary structures added during the planning period resulting in 80 acres of new impervious surface and 101 acres cleared of vegetation. Additional impervious surface and clearing may be necessary for road improvements to access these new primary structures. However, impacts from new roads should be minimized because the proposed SMP requires that new roads be located outside of shoreline jurisdiction whenever possible. Over 75% of the forecasted growth is expected in the “high” ranked river reaches.

- **Sultan River.** Growth along the Sultan River/Marsh Creek corridor is expected to reach approximately 109 new primary structures within the Urban Growth Area and 8 new primary structures in the rural area during the planning period. This forecast corrects for the double counting due to the overlap of Urban and Urban Conservancy designations on individual parcels. Within the urban areas, the development intensity is expected to double from 0.41 to 0.98 primary structures per acre.

New development should address preservation of the existing riparian areas. Careful management of impervious surface, riparian vegetation, wetlands, stormwater runoff and on-site sewage systems will help preserve water quality.

- **SF Skykomish.** The area along the South Fork Skykomish River has been divided into 639 individual parcels averaging less than one half acre each. Only 207 of these parcels contain existing primary structures. The forecast of 104 new primary structures during the planning period is attributed to development on existing vacant lots. There is very little subdivision potential in this reach. Actual development rates may be lower than forecasts indicate due to restrictions related to flooding and channel migration zones.
- **Woods Creek / WF Woods Creek / Carpenter Creek.** The forecast model predicts 147 new primary structures in the Rural Conservancy reaches of Woods Creek and West Fork Woods Creek combined with an additional 4 new primary structures in the Resource designation of Woods Creek. This growth is attributed to development or subdivision of vacant land and to subdivision of large non-vacant parcels.

Further development should address water quality and restoration of riparian vegetation. Clearing, agricultural practices and on-site septic systems should be managed to protect and improve water quality. This subbasin would benefit from both regulatory and non-regulatory offsets to mitigate impacts from development. Offsets should address water movement, water quality, vegetation, habitat, best management practices primarily for residential and agricultural uses, restoration and public education.

- **Pilchuck/Dubuque Creek/Little Pilchuck Creek.** The Pilchuck River subbasin has been divided into four shoreline segments (# 54, 55, 56 and 57). Each segment has been divided into one or more shoreline reach differentiated by the shoreline environment designation. Because of the complexity within this subbasin, the data is shown in Table 8.

There are five reaches ranked as “high” for potential development impacts in the Pilchuck River Subbasin. Shorelands in this subbasin, including Dubuque Creek and Little Pilchuck Creek, are proposed for designation as Natural, Resource, Rural Conservancy, Urban, and Urban Conservancy. The forecast model predicts 292 new primary structures in the subbasin over the planning period. The greatest growth potential (nearly 97%) is in the Rural Conservancy designated areas, the urban area along Little Pilchuck Creek in the Lake Stevens UGA, and the Resource area along the Pilchuck River south of Dubuque Creek.

This subbasin is impacted by flood and channel control structures, impervious surface, agricultural practices, clearing and on-site sewage systems. Water quality and flow regimes have been impaired. This subbasin would benefit from both regulatory and non-regulatory offsets to mitigate impacts from development. Offsets should address water movement, water quality, vegetation, habitat, best management practices, restoration and public education.



**Table 8. Forecast of Potential Development in the Pilchuck River Subbasin.**

<b>PILCHUCK SUBBASIN</b>			<b>Forecast of Potential Impacts</b>					<b>Development Intensity</b>	
<b>Reach ID</b>	<b>Water Name</b>	<b>Environment Designation</b>	<b>New Primary Structures</b>	<b>New Impervious Surface (acres)</b>	<b>New Vegetation Clearing (acres)</b>	<b>Parcels w/ new armoring</b>	<b>New Docks</b>	<b>Primary Structures per acre (existing)</b>	<b>Primary Structures per acre (new)</b>
56	Pilchuck River	Natural	0	0.00	0.00	0	n/a	0.000	0.000
55	Pilchuck River/ Little Pilchuck	Natural	0	0.02	0.03	0	n/a	0.025	0.033
55	Pilchuck River/ Little Pilchuck	Resource	0	0.00	0.00	0	n/a	0.500	0.500
57	Pilchuck River	Resource	2	0.16	0.20	0	n/a	0.000	0.000
54	Pilchuck River/ Dubuque	Resource	23	1.65	2.09	9	n/a	0.283	0.316
54	Pilchuck River/ Dubuque	Rural Conservancy	38	2.71	3.45	11	n/a	0.136	0.166
56	Pilchuck River	Rural Conservancy	75	5.44	6.91	20	n/a	0.115	0.160
55	Pilchuck River/ Little Pilchuck	Rural Conservancy	89	6.42	8.15	27	n/a	0.106	0.141
56	Pilchuck River	Urban	7	0.49	0.63	1	n/a	0.103	0.339
55	Pilchuck River/ Little Pilchuck	Urban	58	4.18	5.31	13	n/a	0.221	0.894
54	Pilchuck River/ Dubuque	Urban Conservancy	0	0.00	0.00	0	n/a	0.074	0.074
55	Pilchuck River/ Little Pilchuck	Urban Conservancy	0	0.00	0.00	1	n/a	0.250	0.250
<b>Pilchuck Subbasin TOTAL</b>			<b>292</b>	<b>21</b>	<b>27</b>	<b>83</b>	<b>0</b>	<b>0.050</b>	<b>0.067</b>

- **Skykomish/Wallace/Elwell/McCoy.** This reach of the Skykomish River, including the lower reaches of the Wallace River, Elwell Creek and McCoy Creek, is located in the 100-year floodplain. It is proposed for designation as Resource and Rural Conservancy. The forecast model predicts 70 new primary structures – 52 in the Resource areas and 18 in the Rural Conservancy areas. Development restrictions in the floodplain will likely result in impacts lower than those predicted by the model.
- **Snohomish River.** The Snohomish River mainstem from the mouth upstream to the Marshland area is proposed for designation as Natural, Resource, Rural Conservancy and Urban. The model forecasts that 45 new primary structures will be added during the planning period within the Resource and Rural Conservancy designated areas. This forecast does not take into account that the area is entirely comprised of floodplain protected by levees. The proposed SMP does not allow new flood control or bank stabilization structures for the purpose of protecting new primary structures. The model does not predict any new primary structures in the Natural or Urban designations. However, the data supporting the Growth Monitoring Report (Snohomish, 2008) suggests that up to 370 new jobs may be added in the Urban portion of this river reach. Impacts may be offset by a combination of regulatory and non-regulatory programs, including offsite restoration.

Development in the lower Snohomish will need to address a broad spectrum of ecological functions and restoration issues. The natural ecological functions in the lower Snohomish and estuary areas have been significantly altered. Riparian vegetation has been reduced or removed. The river has

been channelized and diked disconnecting the river from its floodplain, wetlands and estuary. The levees are designed to be overtopping allowing flooding during periods of high flow but natural sediment distribution processes are impacted by the flood control structures. Transportation structures alter the flow and distribution of large woody debris thereby affecting habitat forming processes downstream in the lower estuary. This area is heavily used by waterfowl and salmonids, most notably ESA-listed species like Chinook salmon, steelhead and Bull Trout. Estuary habitat is key to survival of young salmonids as they adjust to the saltwater environment, hide from predators and grow large enough to compete in the open ocean or Puget Sound. Some salmonids spend as long as six months in estuary habitats.

The most likely uses in the lower Snohomish will be related to shoreline development within the City of Everett and activities in support of the sewage treatment plant, resource-related industrial uses, continuing agricultural practices, recreation and habitat restoration.

- **Quilceda.** The upper reach of Quilceda Creek inside the Marysville UGA is proposed for designation as Rural Conservancy. This reach is currently developed for residential use with large suburban lots and Native Growth Protection Areas preserved along the riparian areas. The Growth Monitoring Report Data predicts that 37 new primary structures may be added during the planning period. Further downstream towards the mouth of Quilceda Creek is an area proposed for designation as Rural Conservancy which is predicted to have 3 new primary structures during the planning period. While a small section of the West Fork Quilceda Creek near 116<sup>th</sup> St. is included in the County's shoreline jurisdiction, no new primary structures are expected in this area which is dominated by state right-of-way for Interstate 5.

*Note: this area has been annexed into the City of Marysville.*

- **Skykomish/NF Skykomish/Deer Creek.** This reach includes Deer Creek, the Skykomish River from Deer Creek upstream to the confluence of the North and South Forks, and continues up the North Fork to the USFS boundary. The reach is proposed for designation as Natural, Resource and Rural Conservancy. Most of the new development activity is expected in the Rural Conservancy area along the lower reach of the North Fork. As with the South Fork described above, this area has been subdivided into numerous small recreation lots along the river. There are 212 parcels in this area only 97 of which contain existing primary structures. The forecast model predicts there will be 34 new primary structures in the Rural Conservancy, 5 new structures in the Resource, and no new structures in the Natural designation. Growth in the Rural Conservancy will be the result of infill rather than subdivision and creation of new lots. Flooding, channel migration and steep slopes may reduce the overall development potential in this shoreline area.
- **Skykomish.** The reach of the Skykomish with a "high" ranking extends from Duffey Creek to Hogarty Creek east of Gold Bar's UGA and includes a large community of small recreation lots. There are 250 parcels in the area, 191 of which already contain primary structures. The area is proposed for designation as Resource and Rural Conservancy with most of the growth expected in the Rural Conservancy. The forecast model predicts 24 new primary structures during the planning period, 23 in the Rural Conservancy and one in the Resource area. Similar to the North and South Fork areas, the growth is expected to be from infill on existing parcels rather than through subdivision and new

lot creation. Flooding, channel migration and steep slopes may reduce the overall development potential in this shoreline area.

### ***Stillaguamish River Watershed***

There are 4,435 parcels in the Stillaguamish River Watershed that contain shoreline jurisdiction lying within the 100-year floodplain or within 200 feet of the ordinary high water mark. Approximately 2,304 of these parcels already contain primary structures. Development intensity is low and most of the shoreline jurisdiction is proposed for Rural Conservancy or Resource environment designations. The forecast model predicts there will be 787 new primary structures added during the planning period resulting in 57 acres of new impervious surface and 72 acres cleared of vegetation. Additional impervious surface and clearing may be necessary for road improvements to access these new primary structures. However, impacts from new roads should be minimized because the proposed SMP requires that new roads be located outside of shoreline jurisdiction whenever possible. Almost 79% of the forecasted growth is expected in the “high” ranked river reaches.

- **SF Stillaguamish.** The South Fork Stillaguamish has three reaches that have been ranked as “high” for potential development impacts. These three reaches (Reach ID # 22, 25 and 27) extend along the South Fork from the confluence with the North Fork upstream to Verlot. These reaches have been proposed for designation as Natural, Resource, Rural Conservancy, Urban and Urban Conservancy. The forecast of potential development is shown in Table 9 including the “high”, “moderate” and “low” ranked reaches along the South Fork Stillaguamish River.

**Table 9. Forecast of Potential Development in the South Fork Stillaguamish.**

<b>SF Stillaguamish</b>			<b>Forecast of Potential Impacts</b>					<b>Development Intensity</b>	
<b>Reach ID</b>	<b>Water Name</b>	<b>Environment Designation</b>	<b>New Primary Structures</b>	<b>New Impervious Surface (acres)</b>	<b>New Vegetation Clearing (acres)</b>	<b>Parcels w/ new armoring</b>	<b>New Docks</b>	<b>Primary Structures per acre (existing)</b>	<b>Primary Structures per acre (new)</b>
27	SF Stillaguamish	Natural	0	0.02	0.03	0	n/a	0.000	0.000
27	SF Stillaguamish	Resource	0	0.00	0.00	0	n/a	0.000	0.000
22	SF Stillaguamish	Resource	3	0.24	0.31	2	n/a	0.027	0.031
27	SF Stillaguamish	Rural Conservancy	74	5.37	6.82	17	n/a	0.104	0.147
22	SF Stillaguamish	Rural Conservancy	5	0.36	0.45	2	n/a	0.078	0.094
25	SF Stillaguamish	Rural Conservancy	104	7.53	9.56	40	n/a	0.243	0.294
22	SF Stillaguamish	Urban	2	0.11	0.14	0	n/a	0.000	0.083
22	SF Stillaguamish	Urban Conservancy	79	5.74	7.29	1	n/a	0.006	0.522
<b>SF Stillaguamish Subbasin TOTAL</b>			<b>268</b>	<b>19</b>	<b>25</b>	<b>62</b>	<b>0</b>	<b>0.093</b>	<b>0.127</b>

The reaches with the greatest growth potential include the Rural Conservancy area between Jim Creek and Canyon Creek (Reach #25 – 104 new primary structures), the Urban Conservancy area in the northeast corner of Arlington’s UGA (Reach #22 – 79 new primary structures), and the Rural

Conservancy area of Reach #27 between Canyon Creek and Verlot (74 new primary structures). While this area along the South Fork Stillaguamish accounts for only about 13% of the shoreline jurisdictional parcel acreage in the Stillaguamish Watershed, over 34% of the growth impacts in the watershed are expected here.

This subbasin has altered sediment transport regimes and excessive sediment load due to commercial logging in the upper watershed. Careful management of impervious surface, riparian vegetation, wetlands, stormwater runoff and on-site sewage systems would improve overall water quality. Public education regarding best management practices for yard maintenance and animal waste removal could also be beneficial.

- **Canyon Creek.** The Canyon Creek area has been divided into numerous small parcels and recreation properties as well as some large resource parcels. This reach has been proposed for designation as Natural, Resource and Rural Conservancy with all of the forecast growth, 103 new primary structures, expected in the Rural Conservancy. This Rural Conservancy area contains 653 parcels, with 300 of these parcels containing no primary structures. Future development is expected to be the result of infill rather than new lot creation. Flooding and channel migration may be limiting factors. New development should address preservation of riparian areas and wetlands to help protect water quality and attenuate flood flows.
- **Pilchuck Creek.** Shoreline jurisdiction along Pilchuck Creek is proposed for designation as Rural Conservancy and Resource. The area is comprised of 120 parcels, 57 of which contain existing primary structures. The forecast model predicts 43 new primary structures during the planning period, all in the Rural Conservancy. The growth is expected to result both from infill and new lot creation.

Further development should address water quality and restoration of riparian vegetation. Clearing, agricultural practices and on-site septic systems should be managed to protect and improve water quality. This subbasin would benefit from both regulatory and non-regulatory offsets to mitigate impacts from development. Offsets should address water movement, water quality, vegetation, habitat, best management practices, restoration and public education.

- **NF Stillaguamish.** The North Fork Stillaguamish has been divided into six reaches each of which contains two proposed shoreline environment designations: Resource and Rural Conservancy (Table 10). The forecast model predicts 25 new primary structures in the Resource environment and 113 new primary structures in the Rural Conservancy environment. Potential impacts in the Rural Conservancy areas of reach ID numbers 13 and 16 are ranked as “high”. Reach 13 is located along the North Fork 100-year floodplain from Montague Creek to the Boulder River. Reach 16 is located along the North Fork 100-year floodplain from the Boulder River to Squire Creek. The reaches along the North Fork account for 17% of the expected growth in shoreline jurisdiction in the Stillaguamish Watershed.

Further development should address water quality and restoration of riparian vegetation. Clearing, agricultural practices and on-site septic systems should be managed to protect and improve water

quality. This subbasin would benefit from both regulatory and non-regulatory offsets to mitigate impacts from development. Offsets should address water movement, water quality, vegetation, habitat, best management practices, restoration and public education.

**Table 10. Forecast of Potential Development in the North Fork Stillaguamish.**

NF Stillaguamish			Forecast of Potential Impacts					Development Intensity	
Reach ID	Water Name	Environment Designation	New Primary Structures	New Impervious Surface (acres)	New Vegetation Clearing (acres)	Parcels w/ new armoring	New Docks	Primary Structures per acre (existing)	Primary Structures per acre (new)
6	NF Stillaguamish	Resource	5	0.36	0.46	3	n/a	0.029	0.032
8	NF Stillaguamish	Resource	10	0.71	0.91	3	n/a	0.036	0.042
11	NF Stillaguamish	Resource	9	0.63	0.80	7	n/a	0.092	0.102
13	NF Stillaguamish	Resource	1	0.05	0.06	0	n/a	0.003	0.004
16	NF Stillaguamish	Resource	0	0.00	0.00	0	n/a	0.000	0.000
19	NF Stillaguamish	Resource	0	0.00	0.00	0	n/a	0.000	0.000
6	NF Stillaguamish	Rural Conservancy	11	0.78	0.99	3	n/a	0.022	0.028
8	NF Stillaguamish	Rural Conservancy	7	0.51	0.64	0	n/a	0.022	0.044
11	NF Stillaguamish	Rural Conservancy	4	0.27	0.34	0	n/a	0.023	0.045
13	NF Stillaguamish	Rural Conservancy	37	2.71	3.44	5	n/a	0.067	0.105
16	NF Stillaguamish	Rural Conservancy	42	3.01	3.82	12	n/a	0.126	0.166
19	NF Stillaguamish	Rural Conservancy	12	0.85	1.08	2	n/a	0.068	0.108
NF Stillaguamish Subbasin TOTAL			137	9.88	12.54	36		0.044	0.057

- **Jim Creek/Cub Creek.** Cub Creek, Twin Lakes and the Jim Creek reach above Cub Creek are all ranked “low” for potential development impacts. Jim Creek below Cub Creek is ranked “high”. This area is proposed for designation as Rural Conservancy with some Resource parcels and is currently developed as large rural parcels (average size is over 10 acres per parcel) used for residential, agricultural and forestry activities. The forecast model predicts 41 new primary structures. This growth forecast does not significantly impact the overall development intensity in this area.

The lower reach of Jim Creek has been impacted by agricultural practices, failing septic systems and clearing of riparian vegetation. Water quality is impaired. Further development in the area should restore riparian areas and carefully manage stormwater runoff, impervious surface and on-site sewage systems. Public education regarding best management practices would be beneficial.

- **Church Creek.** The Church Creek corridor is proposed for designation as Rural Conservancy and as Urban where shoreline jurisdiction overlaps with the Stanwood UGA. The Urban portion is predicted to grow by 41 new primary structures during the planning period while the Rural Conservancy areas are forecast to add 11 new primary structures.



Church Creek has been impacted by clearing of riparian areas for agricultural practices although some segments riparian areas remain intact. Further development should preserve these intact riparian zones. Urban development will utilize public sewer systems. Best management practices for agricultural activities would help improve and preserve water quality.

- **Stillaguamish River/Portage Creek.** Reaches within the Stillaguamish mainstem are ranked as “high” and three reaches are ranked as “Moderate” for a total forecast of 109 new primary structures (Table 11). This area is characterized by large parcels within the 100-year floodplain currently used for farming activities. Because of development restrictions in the floodplain and local interest in preserving farmlands for agricultural purposes, this level of development may not occur as predicted. New flood control structures are not allowed for the primary purpose of protecting new primary structures. Flooding in the lower Stillaguamish will affect the development potential.



**Figure 17.** Flooding in the Stillaguamish Valley, view from Miller Rd., 2009.

Development in the lower Stillaguamish will need to address a broad spectrum of ecological functions and restoration issues. The natural ecological functions in the lower Stillaguamish and estuary areas have been significantly altered. Riparian vegetation has been reduced or removed. Water quality has been affected with high levels of fecal coliform, sedimentation and low levels of dissolved oxygen observed. Local uses which may be contributing to water quality issues include residential septic systems and pet waste, crop and livestock agricultural activities and a sewage treatment plant. The river has been channelized and diked disconnecting the river from its floodplain, wetlands and estuary. The levees are designed to be overtopping allowing flooding during periods of high flow but natural sediment distribution processes are impacted by the flood control structures. Transportation structures alter the flow and distribution of large woody debris

thereby affecting habitat forming processes downstream in the lower estuary. This area is heavily used by waterfowl and salmonids, most notably ESA-listed species like Chinook salmon, steelhead and Bull Trout. Estuary habitat is key to survival of young salmonids as they adjust to the saltwater environment, hide from predators and grow large enough to compete in the open ocean or Puget Sound. Some salmonids spend as long as six months in estuary habitats.

**Table 11. Forecast of Potential Development in the Stillaguamish Mainstem / Portage Creek.**

Stillaguamish / Portage			Forecast of Potential Impacts					Development Intensity	
Reach ID	Water Name	Environment Designation	New Primary Structures	New Impervious Surface (acres)	New Vegetation Clearing (acres)	Parcels w/ new armoring	New Docks	Primary Structures per acre (existing)	Primary Structures per acre (new)
1	Stillaguamish River / Lower Portage Creek	Resource	23	1.67	2.12	6	n/a	0.026	0.029
1	Stillaguamish River / Lower Portage Creek	Rural Conservancy	12	0.90	1.15	10	n/a	0.124	0.137
2	Stillaguamish River / Upper Portage Creek	Resource	15	1.10	1.39	1	n/a	0.032	0.038
2	Stillaguamish River / Upper Portage Creek	Rural Conservancy	18	1.30	1.65	7	n/a	0.095	0.120
2	Stillaguamish River / Upper Portage Creek	Urban Conservancy	41	2.93	3.72	0	n/a	0.051	0.737
Subbasin TOTAL			109	7.90	10.03	23	n/a	0.038	0.046

### ***Potential Cumulative Impacts***

These results indicate that the majority of the future development along rivers and streams will consist of continued agricultural activities, forestry-related uses, and residential development within areas that currently have mixed and moderate-level use. This could result in the following types of impacts to shoreline ecological function:

- **Vegetation:** Decrease in shoreline vegetation as clearing for agricultural and residential uses continue.
- **Water Movement:** Disturbance of riparian vegetation can affect recruitment of large woody debris and other organic material, which in turn can affect flow rates and natural channel-forming processes. Increased development of all forms may result in such impacts. In addition, channelization and creation of dams or other in-water structures is sometimes associated with resource-related uses; these types of uses and impacts might increase under future development.
- **Water Quality:** Increase in runoff and associated water quality impacts due to increased agricultural, logging, or other resource-related uses.

- **Habitat:** Potential loss of or disturbance to riparian habitat during clearing for agriculture or logging; potential damage to aquatic habitat via runoff from agricultural use.

While it is assumed that there will be some infill and expansion in already modified river/stream shoreline areas, the types of development that will occur will typically be more heavily regulated under the Proposed Program. For example, 29,533 acres of river/stream shoreline area currently used for agricultural purposes and that carries a designation of Rural under the Existing Program would change to a Resource designation under the Proposed Program (Snohomish County 2009a). This re-designation would place additional conditions and review requirements upon instream and overwater structures (30.67.430), and would apply to a significant area of river/stream shoreline – more than half (61.3 percent) of all the proposed Resource shoreline areas across all waterbody types. Such restrictions will further help to maintain the “no net loss” standard even as development continues over the planning period. The specific regulatory and non-regulatory measures that are anticipated to offset the potential impacts are described further in Section 4.

However, in some cases, the proposed SMP might allow for greater and more flexible types of river/stream shoreline development. For example, 3,858 acres of the river/stream shoreline area that is currently designated as Conservancy would change to a Rural Conservancy designation under the Proposed Program (Snohomish County 2009a). This shift in designation would result in changes to the requirements for some shoreline modifications along riverine areas:

- Marinas would shift from a prohibited use on lakes and rivers to a conditional use;
- Docks and piers would shift from a conditional use to a permitted use but location and design standards and construction material provisions are more sensitive to ecological functions;
- Bulkheads and other structural bank stabilization or flood protection measures would shift from a permitted use to a conditional use requiring geotechnical analysis and mitigation for any impaired functions;
- Boat launches and ramps would shift from a conditional use to a permitted use but standards under the proposed SMP require compliance with the no net loss standard for ecological functions ; and
- Under the current program, fill is not allowed within 100 feet of the OHWM within the Conservancy environment but otherwise permitted. Under the proposed SMP, fill is permitted in the Rural Conservancy and conditional in the Aquatic.

### **3.2 Potential Impacts by Proposed Shoreline Environment Designation**

The Supplemental Environmental Impact Statement (SEIS) for the proposed SMP (Snohomish, 2009a) compares the existing shoreline designations in the SMMP with the proposed designations under the updated SMP. The SEIS looks at the qualitative impacts associated with a shift from each SMMP designation to each of the new designations under the proposed SMP (refer to Table 6a in the SEIS). The SEIS also examines the quantitative impacts in terms of the estimated total acreages affected by these shifts in environment designations from old to new. This CIA takes the quantitative analysis one step further by estimating the scope of potential future development within each shoreline

environment (Table 12) and assessing how the proposed SMP will mitigate potential impacts from this future development.

The proposed SMP utilizes seven shoreline environment designations: Aquatic, Natural, Resource, Rural Conservancy, Urban, Urban Conservancy and Municipal Watershed Utility (MWU). Each shoreline environment designation is subject to unique management criteria and regulatory standards that determine the type and scale of development that will be allowed in any given shoreline area. In general, the more sensitive or higher value the shoreline ecological functions, the more restrictive the management criteria and regulations need to be to provide the required level of protection. Section 4 discusses the regulatory offsets designed to mitigate potential impacts from development.

Because the development potential for new primary structures is essentially zero in the Aquatic and MWU environments, they were not included in the detailed data analysis. However, a qualitative discussion of the potential future development in these shoreline environments is provided below. Potential demand for new bank armoring is based on the number of parcels with existing primary structures that are currently not armored. The model does not account for the structures that are already set back an adequate distance from the water or that may not be experiencing significant erosional forces prompting the need for bank protection. Thus, the model overstates the potential demand for bank armoring.

### 3.2.1 Aquatic

The Aquatic designation only occurs waterward of the ordinary high water mark. Parcels that contain only an Aquatic designation are typically covered by water and are not available for development of primary structures or subdivision into new parcels. Even new marina development typically occurs above the ordinary high water mark by excavating below sea level (examples include the Hat Island Marina and the Tulalip Marina). In addition, most parcels that contain only Aquatic designation have no parcel data or ownership attributes in the County Assessor records – they are essentially blank space demarking the boundaries of other parcels. These Aquatic areas were, therefore, not included in this analysis. Parcels that contain the Aquatic designation and an upland designation (waterfront parcels) were analyzed in conjunction with their upland designation. Potential development that may occur in the Aquatic designated portions of a parcel coincident to upland development (i.e., docks or bulkheads accessory to single-family development) was included in the analysis and attributed to the upland designation.

Aquatic areas expected to see the greatest number of new docks are lakes. Because of the hydraulic forces along marine and river shorelines, docks are not typically built. The lakes with the greatest potential for new docks are Stevens (34), Martha (south) (25), Stickney (22), Serene (15) and Roesiger (7). This potential is calculated based on the number of new and existing parcels currently without docks and on growth rates for new primary structures within urban and rural areas.

Bank stabilization and armoring is most likely to occur along marine shorelines, lakes where power boat use and water skiing are allowed, and along heavily parcelized riverfront properties where erosion rates are high. Most of the low-bank marine shorelines have already been developed and armored.

- New armoring would be most likely to occur along Hat Island, Warm Beach/Kayak Point areas and Priest Point. Replacement structures will likely outnumber new structures along marine shorelines.

- Power boat use at the higher speeds necessary for water skiing and wake-boarding is allowed on Lake Stevens, Lake Goodwin, Lake Roesiger, Flowing Lake and Lake Shoecraft. These lake shorelines see increased erosion due to wave action and have been armored accordingly as can be seen in the state Department of Ecology's Coastal Atlas photos for these larger lakes. Existing armoring along lake shorelines is a data gap in Snohomish County so it is unknown how many developed parcels have already been armored and how many are not. New armoring will be limited under the proposed SMP only for the protection of existing structures but it is unknown how many existing structures may need such protection. New armoring will not be allowed for new primary structures so the forecast model cannot predict how many new bulkheads may be installed.
- Along river waterfront, new armoring will be related to the number of existing structures and the level of risk to those structures from the river's erosional forces. The forecast model only looks at the number of parcels with primary structures that are not currently armored and predicts the potential growth in new armoring based on urban or rural growth rates. New development does not contribute to increases in armoring because, under the proposed SMP, new armoring is only allowed for the protection of existing structures. Not all of the predicted armoring will be installed because many of the structures on riverfront parcels are not at risk – they may be set well back from the OHWM and/or be subject to depositional processes rather than erosion.

Under the proposed SMP, allowed uses in the Aquatic environment are limited to the water-dependent portions of an approved use on the adjacent shorelands. Most uses or modifications below the ordinary high water mark would require a conditional use permit and be subject to a "no net loss" standard for shoreline ecological functions. In-water structures would be subject to location, design and construction materials restrictions to minimize impacts on aquatic habitat and water quality. Construction timing may also be regulated to avoid seasonal or life cycle impacts (ie., runoff and erosion during the rainy season or habitat disruption during spawning or rearing).

### 3.2.2 Natural

Areas designated as Natural have the highest value in terms of ecological functions. Natural areas have intact ecosystems. Over seventy percent of the land area in the Natural shoreline environment is government-owned property (132 parcels, 12,101 acres ). Future use of these government-owned lands is likely limited to conservation, park development, and passive recreation. (Government owned lands managed for timber production have been assigned the Resource designation instead of Natural). For the remaining 30% of the Natural designated shorelines, the future forecast is for only 13 new primary structures, 8 new docks and less than three acres of clearing or new impervious surface during the planning period 2007 through 2025.

Forecast numbers do not reflect primary structures associated with park development. Overall, the development intensity (primary structures per acre) is very low and will not be appreciably affected by such a low level of future development. Too offset the potential impacts from development, the proposed SMP contains standards and use restrictions that reflect the protection needs for the shoreline ecological functions. For example, to offset impacts from the future forecast for new docks, docks are not permitted in the Natural environment or in the adjacent Aquatic environment. Over-water floating walkways may be developed in conjunction with recreation development.



Development in the Natural environment is more restrictive than other shoreland environments. The range and intensity of allowed uses is reduced. Where development is allowed, ecological disruption should be minimized and natural vegetation preserved. Shoreline modifications are permitted only in conjunction with restoration projects.

**Table 12. Potential Future Development Summarized by Shoreline Environment Designation**

Data	Proposed Shoreline Environment Designations in the Updated SMP				
	Natural	Resource	Rural Conservancy	Urban	Urban Conservancy
<b>Existing Conditions:</b>					
Acres in shoreline jurisdiction	5023	49133	14877	1190	436
Total Parcels	296	4280	10733	1277	284
Total Parcel Acres *	17014	108334	45558	1920	706
Primary Structures	60	1646	6651	937	204
Waterfront Parcels:	220	2011	8125	844	235
w/ primary structures	38	752	5228	640	173
w/ armoring	3	231	707	47	0
Docks	11	5	1699	337	2
<b>Potential Future Development</b>					
New Primary Structures	13	275	1675	791	248
New Impervious Surface (acres)	2.35	18.96	121.10	57.21	17.92
New Vegetation Clearing (acres)	2.99	25.22	153.78	72.64	22.75
Parcels with new armoring	3	68	341	127	113
New Docks	8	1	90	89	7
<b>Development Intensity</b>					
Existing primary structures/acre	0.004	0.015	0.146	0.488	0.289
Forecast primary structures/acre	0.005	0.018	0.183	0.900	0.640
* Acreage includes the entire parcel even if only a portion of the parcel lies within shoreline jurisdiction. Parcel acreage may also be double-counted when a single parcel contains two or more shoreline environment designations.					

### 3.2.3 Resource

The actual area proposed for designation as Resource covers approximately 49,133 acres. The acreage numbers reported in Table 10 are distorted due to inclusion of very large parcels out in forested areas where only a fraction of the parcel is actually in shoreline jurisdiction.

Development options are more varied in the Resource environment. Impacts will be offset by the specific use and modification regulations in the proposed SMP, the critical area regulations and mitigation requirements. The future development potential forecast of 275 new primary structures is overstated given development restrictions in the forested areas, floodplains and channel migration zones. Non-regulatory programs such as purchase or transfer of development rights will also reduce the

actual development occurring in the Resource areas. Restoration projects will help to further offset development-related loss of ecological functions.

The predominant uses in these areas will continue to be farming and timber management. On-going agricultural activities and commercial forest practices are not regulated by the Shoreline Management Act.

#### **3.2.4 Rural Conservancy**

As with the Resource designation, the total acreage of the parcels containing Rural Conservancy shorelines is much larger than the actual acreage in shoreline jurisdiction. The parcels cover 45,558 acres while the Rural Conservancy shoreline area is only 14,877 acres. The future forecast is attributed to the entire parcel acreage, not just to that portion within shoreline jurisdiction. Proposals for new development are also parcel based and are not typically limited to shoreline jurisdiction. The result is that the future forecast overstates the potential development impacts within shoreline areas. Buffer requirements in the proposed SMP will require development to be located 150 feet or more from the ordinary high water mark. Since the Rural Conservancy designation typically extends only 200 feet from the ordinary high water mark, most development impacts will occur in the outer fifty feet of shoreline jurisdiction or on the portion of the rural parcel that is outside of shoreline jurisdiction. Residential subdivisions are required to use cluster development with the shoreline areas included in the undeveloped open space areas. Use limitations, design standards, buffer and mitigation requirements and vegetation retention requirements should offset any impacts to shoreline ecological functions.

Actual forecast numbers are the highest in the Rural Conservancy environment but overall development intensity does not change much. Most new development is likely to occur on existing small lots. These lots were established prior to current zoning regulations. Channel migration zone regulations will limit new development adjacent to the major rivers.

The forecast for new armoring is based on the potential population growth scenario – not on the presence of hydrogeologic conditions that might necessitate armoring for existing structures. Since armoring new structures is prohibited, new armoring is not directly related to growth but may be indirectly related because impacts from new development could alter conditions such that existing structures would need armoring in the future. The goal is to prevent such indirect impacts by managing stormwater runoff and limiting new impervious surface. New armoring may be needed to protect existing structures because the river systems are dynamic, constantly altering the channel and eroding the river banks.

#### **3.2.5 Urban**

In terms of change in development intensity, areas designated Urban have the greatest potential for impacts. However, the shoreline ecological functions have already been impacted by existing conditions. Steep slopes, wetlands and urban stream flooding will reduce growth potential. The forecast does not address employment growth and the related development of non-residential primary structures – some areas ranked as “low” for potential impacts may not be accurately characterized, such as: Little Bear Creek, the Stillaguamish estuary and Church Creek inside the Stanwood UGA, properties on the east side of the Lake Stevens UGA, and along the Snohomish River waterfront near Snohomish, Marysville and Everett. While these areas are not forecast for new residential structures they are expected to experience employment growth. The proposed SMP limits the location and type of

commercial and industrial development allowed in shoreline jurisdiction. Such commercial development should:

- have a water-dependent component,
- provide public access or ecological restoration opportunities, and
- be located over 200 feet from the ordinary high water mark or be physically separated from the water by an intervening property or public right-of-way. In the Urban environment, commercial uses located over 200 feet from the ordinary high water mark will most likely be outside of shoreline jurisdiction.

Residential development in the Urban environment will be through infill on existing small lots, residential subdivisions of vacant land or redevelopment of large lots. Regulatory offsets are described in Table 15.

### 3.2.6 Urban Conservancy

Urban Conservancy areas contain high value ecological systems but are located inside an Urban Growth Area and are typically surrounded by urban development. Because of the ecological sensitivity, most new development proposed at urban intensities would require a conditional use permit under the proposed SMP. The reaches included in the Urban Conservancy environment are shown in Table 13.

**Table 13. Potential Future Development in the Urban Conservancy Environment**

URBAN CONSERVANCY		Forecast of Future Potential Development					Development Intensity	
Reach ID	Water Name	New Primary Structures	New Impervious Surface (acres)	New Vegetation Clearing (acres)	Parcels w/ new armoring	New Docks	Primary Structures per acre (existing)	Primary Structures per acre (new)
22	SF Stillaguamish	79	5.74	7.29	1	n/a	0.006	0.522
103	Stickney	49	3.58	4.54	n/a	7	0.186	1.336
51	Sultan River/ Marsh Creek	42	3.00	3.82	23	n/a	0.336	0.685
2	Stillaguamish River / Upper Portage Creek	41	2.93	3.72	0	n/a	0.051	0.737
29	Quilceda Creek*	37	2.66	3.38	86	n/a	1.036	1.305
54	Pilchuck River/ Dubuque	0	0.00	0.00	0	n/a	0.074	0.074
58	Sauk	0**	0.00	0.00	1	n/a	0.008	0.008
55	Pilchuck River/ Little Pilchuck	0**	0.00	0.00	1	n/a	0.250	0.250
31	Snohomish	0	0.00	0.00	0	n/a	0.364	0.364
32	Snohomish/ French Creek	0	0.00	0.00	1	n/a	0.059	0.059

\* Quilceda Creek has been annexed into the City of Marysville.

New development in the reaches with "high" ranking for future development potential will be subject to use limitations, restrictive design standards and the "no net loss" standard for ecological functions. In the Urban conservancy, the following restrictions would apply:

- Boating facilities are limited to boat ramps, private docks and boathouses, floats and mooring buoys. Each of these facilities would require a conditional use permit.
- Commercial and industrial uses are not allowed.
- Single-family houses and mobile homes are permitted, but duplexes, townhouses, multi-family and single-family-detached-unit developments would require conditional use permits.
- Use of fill requires a conditional use permit unless it is part of a restoration project.
- Most common utility facilities would be subject to conditional use permits. It is recommended that these facilities be located over 200 feet from the ordinary high water mark whenever possible.

The parcels along the Sultan River contain two upland designations – Urban Conservancy along the riverfront and Urban further inland (see Figure 1). The development potential for these lots (55 parcels, 101 acres, 42 new primary structures) has been included under both the Urban Conservancy and the Urban forecasts resulting in double counting of impacts.

The forecast model does not address employment growth. Areas where no new residential primary structures are forecast may be forecast for employment growth or new development related to agricultural activities. The data for the Growth Monitoring Report (Snohomish, 2008) predicts employment growth along the Sauk and Little Pilchuck Creek \*\* (see Table 13). However, the proposed SMP does not allow commercial or industrial development in the Urban Conservancy environment.

### **3.2.7 Municipal Watershed Utility**

The Municipal Watershed Utility designation is made up of Spada Lake (1776 acres) and its shorelands (445 acres) plus some adjacent shoreline area along the Sultan River and the South Fork Sultan River (31 acres). Development around Spada Lake is restricted by the conditions of the Federal Energy Regulatory Commission license for the dam. The only current and foreseeable future development in the MWU designation is related to the infrastructure necessary to maintain its status as a Public Utilities District (PUD) water reservoir. No future residential or other development is anticipated.

## **3.3 County-Wide Impacts**

County-wide trends and potential cumulative impacts across all waterbody types were also considered when developing the SMP for Snohomish County. First, development patterns and trends common across all three waterbody types throughout the County were compared. Then activities or impacts that are expected to occur with approximate equal frequency across the entire County (versus those identified above, which are most likely to occur within certain waterbody types or based on certain land use types) were identified. Following are the expected County-wide impacts expected to occur over the planning period under the Proposed Program:

- Marine shorelines are at highest risk of potential impacts. Of the three waterbody types, Marine shorelines ranked “high” or “moderate” have the highest overall potential density of new development, with an average of one new primary structure for every 8 acres. In contrast, average potential development in the “high” or “moderate” ranked lake reaches would be only one new structure for every 11.5 acres of shoreline and similarly ranked river reaches would be only one new structure for every 47.6 acres of shoreline.
- Providing increased public access may bring disturbance-related impacts. Despite protections in the Proposed Program for actually building any new parks and/or public access areas (e.g., ramps, piers, etc.), there will be indirect, likely insignificant impacts associated with increased foot traffic and noise. Such impacts would be in the form of increased disturbance to riparian vegetation and nearshore areas.
- There may continue to be potential impacts associated with activities currently exempt from SMA permitting. These types of activities include residential construction and associated activities and are listed specifically in Section 3.3.2. It is expected that the impacts of each particular residential development would be small and isolated – such as loss of vegetation, habitat and shoreline functions on very small scales. In addition, these activities must comply with all substantive policies and regulations of the local master program including the critical area regulations. As long as a permit is required (i.e., grading, construction), the county can track all development in shoreline jurisdiction even if a shoreline substantial development permit is not required.

It should be noted that in many cases parcel acreage extends outside of shoreline jurisdiction. Development forecasts presented in this CIA are based on the entire parcel, not just on the portion within shoreline areas. Policies and regulations in the proposed SMP will cause much of the actual construction, new impervious surface and vegetation removal to occur outside of shoreline areas.

### 3.3.1 Development Exempt From Permitting

The proposed SMP retains the existing permitting exemptions found in WAC 173-27-040 for certain types of development, including:

- Single family residences,
- Normal protective bulkhead for single family residences,
- Normal maintenance and repair of existing structures,
- Docks worth less than \$5,000 (saltwater) or \$10,000 (freshwater),
- Normal farming activities, and
- Emergency construction needed to protect property.

With this in place, landowners can and will continue to modify the physical conditions of their property through unregulated (exempt from permitting) activities such as small-scale land clearing for view corridors, increasing yard space and landscaping. Other likely exempt activities include construction of small sheds and outbuildings (below the size requiring a building permit), building ornamental rockeries and patios, and construction of parking aprons. The impacts associated with these activities are not quantifiable under the current CIA methodologies but are expected to be primarily in the form of



decreased amounts of shoreline vegetation and resulting habitat impacts, and increased impervious surface area and resulting impacts to water infiltration and movement. Impacts at the individual parcel level will be small scale and insignificant, but when taken together at a reach- or County-wide scale, could become more meaningful.

It should be noted that under state law an exemption from shoreline permit requirements is *not* an exemption from the policies and regulations in the proposed SMP or from other permit requirements (i.e., building permits, grading permits, flood hazard permits, etc.). The county has the ability to track permitted activities, even when no permits are required under the SMP, and can link these activities to empirical observations from the ecological monitoring program for evaluating compliance with “no net loss” standards. The monitoring program for “no net loss” is discussed in more detail in section 4.4 of this cumulative impact analysis and in section 4.5 of the SEIS.

## 4.0 REGULATORY OFFSETS

### 4.1 Proposed SMP Regulations

The policies and regulations contained within the Proposed Program address many of the shoreline functions that may be impacted by foreseeable future development. The specific elements of new proposed regulations that will offset each impact area are described below. Most of these requirements are contained within either the general policies of the Proposed Program, or in specific regulations within the use and modification requirements and the shoreline regulations and development standards in SCC 30.67.

- Vegetation: Measures to preserve riparian and nearshore vegetation and offset development-related impacts include:
  - Alteration of natural topographic features and/or flora of the site is restricted to that necessary for placement of residences and structures (SCC 30.67.570 and 30.67.599)
  - Use of vegetated buffers with low-impact management techniques is recommended (SCC 30.67.599)
  - Clustered development, with the open space area preserving and providing access to the water, is required for subdivisions or short subdivisions (SCC 30.67.570(1)(a)).
- Water Movement: Measures to preserve natural shoreline systems, maintain feeder bluffs and encourage natural sediment flows include:
  - Design and siting of new breakwaters, jetties and groins must also avoid and/or mitigate impacts to shoreline formation (SCC 30.67.320 and 30.67.520).
  - Design and siting of new docks, piers, and floats must avoid and/or mitigate impacts to critical areas and functions (SCC 30.67.320 and 30.67.515).
  - New bulkheads are prohibited unless they are the only feasible shoreline stabilization method; bulkheads strongly discouraged under both existing and Proposed Program (SCC 30.67.575).
  - Significant new location and design standards on shoreline stabilization structures (e.g., bulkheads) require that impacts to immediate and adjacent shoreline areas be minimized (SCC 30.67.575).
  - Shoreline substantial development permit is still required for all projects with a value over \$5,718 (SCC 30.44.120).
- Water Quality: Requirements that aim to protect and enhance water quality include:
  - Commercial development within shoreline areas must comply with new guidelines to decrease potential for runoff and spill-related contamination (SCC 30.67.525).
  - All types of shoreline resource-related uses (e.g., agriculture, aquaculture, forestry and ports) must comply with provisions to protect water quality (SCC 30.67.505, 30.67.510, 30.67.545, and 30.67.550)

- Construction materials and fill restricted to prevent contamination (SCC 30.67.515, 30.67.530 and 30.67.535)
- Habitat: Requirements that aim to preserve and enhance existing aquatic, nearshore and riparian habitat include:
  - New boating facilities must be designed to protect ecologically sensitive areas (e.g., eelgrass beds, forage fish spawning areas, etc.) and to minimize need for stabilization structures (SCC 30.67.515)
  - New utility structures near critical shoreline areas (e.g., feeder bluffs, tidelands) are prohibited (SCC 30.67.595).
  - Clustered development, with the open space area preserving and providing access to the water, is preferred for subdivisions or short subdivisions (30.67.570(1)(a)).
  - Use of vegetated buffers with low-impact management techniques recommended (SCC 30.67.599).

#### 4.1.1 Critical Area Regulations

The proposed SMP adopts the County's current critical area regulations (CAR) to fulfill the requirements of WAC 173-26-221 and RCW 36.70A.480.

- Local CAR: SCC 30.62A, 30.62B, 30.62C and 30.65 outline development regulations that apply to critical areas. The proposed SMP explicitly recognizes that shoreline areas that meet the definition of critical areas are subject to protection under the County's CAR which are adopted as part of the proposed SMP. The CAR provides strict protections for the following types of areas: wetlands, wildlife habitat conservation areas; geologic hazard areas; critical aquifer recharge areas; critical saltwater and freshwater habitat; and flood hazard areas. The CAR addresses the following shoreline functions:
  - Vegetation retention: preservation of natural vegetated buffers adjacent to streams, lakes, marine shorelines and wetlands and on steep slopes (SCC 30.62A.320, 30.62B.320((1)(a)(iv), 30.62B.340(3)(a)); very limited allowances for disturbance or development activities within buffers (SCC 30.62A.320(2); preference for LID techniques (SCC 30.62A.350) and non-structural, bioengineering solutions using natural vegetation (SCC 30.62B.320(2)).
  - Water movement: very limited disturbance allowed below OHWM of streams, lakes or marine waters; bank stabilization allowed only under limited circumstances (SCC 30.62A.330, 30.62B.320(2)); development activities prohibited in the channel migration zones (SCC 30.62B.330(3)); development restricted in flood hazard areas (SCC 30.65).
  - Water quality: prevent or mitigate impacts from stormwater runoff and limit effective impervious surface (SCC 30.62B.320(1), 30.62A.320(1)(c)); minimize need for modifications and preserve natural water and sediment processes (SCC 30.62A.330(2)(a)); restrictions on construction materials for in-water structures (SCC 30.62A.330(2)(f)).
  - Habitat: in addition to the vegetation retention requirements outlined above, protection is required for the primary association areas of critical species (SCC 30.62A, Part 400); in-water structures must avoid critical saltwater habitats (SCC 30.62A.330(2)(f)).

The linkages between the specific potential impacts on shoreline ecological functions are summarized in Tables 14A, 14B, and 14C. Regulations to offset these potential impacts are shown by ecological function, water type and shoreline use in Table 15.

**Table 14A. Summary of Potential Cumulative Impacts – Lake Shoreline Reaches**

Shoreline Function	Major Type(s) of Foreseeable Future Development Likely to Affect Shoreline Function	Potential Impacts to Shoreline Function
Vegetation	<ul style="list-style-type: none"> <li>Continued residential infill</li> <li>Dock, pier, or ramp construction associated with residential use</li> <li>Continued and expanded light agricultural use</li> </ul>	<ul style="list-style-type: none"> <li>Continued decrease in mature shoreline vegetation as clearing for new construction and other uses continues</li> <li>Vegetation loss means greater potential for increased erosion, bank instability, turbidity, higher water temperatures</li> <li>Habitat loss for benthic community, less LWD for habitat forming processes</li> </ul>
Water Movement	<ul style="list-style-type: none"> <li>Dock, pier, or ramp construction associated with residential use</li> <li>Bulkhead development associated with single family</li> <li>Increased impervious surface</li> </ul>	<ul style="list-style-type: none"> <li>Further impairment of water movement and hydrologic function</li> <li>Disruption of hyporheic exchange and shoreline wetlands</li> <li>Change in stormwater management, flow rate, volume</li> <li>Shoreline scour from downward force of waves hitting bulkheads</li> </ul>
Water Quality	<ul style="list-style-type: none"> <li>Dock, pier, or ramp construction associated with residential use</li> <li>Continued residential infill</li> <li>Continued and expanded light agricultural use</li> </ul>	<ul style="list-style-type: none"> <li>Water quality impacts associated with construction of docks and other in-water structures (e.g., spills, harmful materials use)</li> <li>Increase in runoff and associated water quality impacts with the creation of new impervious surfaces for residential use</li> <li>Increase in pesticide and fertilizer inputs into lake reaches resulting from agricultural uses</li> <li>Removal of shoreline vegetation impacts erosion and bank stability, increases turbidity and water temperatures</li> </ul>
Habitat	<ul style="list-style-type: none"> <li>Continued residential infill</li> <li>Dock, pier, or ramp construction associated with residential use</li> <li>Bulkhead development associated with single family</li> <li>Continued and expanded light agricultural use</li> </ul>	<ul style="list-style-type: none"> <li>Loss of or disturbance to riparian habitat during residential construction and use</li> <li>Increased shading in nearshore lake habitat areas resulting from dock and pier construction</li> <li>Increase in pesticide and fertilizer inputs into lake reaches resulting from agricultural uses</li> <li>Habitat loss for benthic community, less LWD for habitat forming processes</li> </ul>

**Table 14B. Summary of Potential Cumulative Impacts – River/Stream Shoreline Reaches**

Shoreline Function	Major Type(s) of Foreseeable Future Development Likely to Affect Shoreline Function	Potential Impacts to Shoreline Function
Vegetation	<ul style="list-style-type: none"> <li>Continued expansion of agricultural and other resource-based uses</li> <li>Additional residential development within existing pockets of residential uses</li> <li>Creation of more parks/public access sites</li> </ul>	<ul style="list-style-type: none"> <li>Decrease in shoreline/riparian vegetation as clearing for agricultural and residential uses continue.</li> <li>Vegetation loss means greater potential for increased erosion, bank instability, turbidity, higher water temperatures</li> <li>Habitat loss for benthic community, less LWD for habitat forming processes</li> </ul>
Water Movement	<ul style="list-style-type: none"> <li>Additional residential development within existing pockets of residential uses and potential associated shoreline modification such as bulkheads</li> <li>Creation of more parks/public access sites – construction of shoreline modifications associated with access and water recreation</li> </ul>	<ul style="list-style-type: none"> <li>Reduction in LWD recruitment and other organic material as shoreline habitats are altered for residential and recreational use</li> <li>Modification of flow regimes and channel migration with construction of buildings, roads, docks, ramps, or other recreational-use structures</li> <li>Increased runoff from added impervious surface and vegetation loss, potential for flooding increases, higher flows mean greater potential for erosion and less potential for groundwater recharge</li> <li>Reduced groundwater recharge combined with increased stormwater runoff rates means higher high flow volumes and lower seasonal low flow rates.</li> <li>Higher flows alter stream sediment distribution – sand and gravel</li> </ul>
Water Quality	<ul style="list-style-type: none"> <li>Continued expansion of agricultural and other resource-based uses</li> <li>Additional residential development within existing pockets of residential uses</li> <li>Creation of more parks/public access sites</li> </ul>	<ul style="list-style-type: none"> <li>Increase in runoff and associated water quality impacts due to increased agricultural, logging, or other resource-related uses</li> <li>Water quality impacts associated with construction of docks and other in-water structures (e.g., spills, harmful materials use)</li> <li>Increase in runoff and associated water quality impacts with the creation of new impervious surfaces for residential use</li> <li>Vegetation loss means less filtration of excess nutrients, sediments and pollutants during hyporheic exchange</li> </ul>
Habitat	<ul style="list-style-type: none"> <li>Continued expansion of agricultural and other resource-based uses</li> <li>Additional residential development within existing pockets of residential uses and associated shoreline modifications such as bulkheads</li> <li>Creation of more parks/public access sites</li> </ul>	<ul style="list-style-type: none"> <li>Potential loss of or disturbance to riparian habitat during clearing for agriculture or logging</li> <li>Potential damage to aquatic habitat via runoff from agricultural use</li> <li>Loss of or disturbance to riparian habitat during residential construction and use</li> <li>Loss of habitat for benthic community, less LWD for habitat forming processes</li> <li>Increased flow rates scour and redistribute gravel beds needed for spawning</li> </ul>



**Table 14C. Summary of Potential Cumulative Impacts – Marine Shoreline Reaches**

Shoreline Function	Major Type(s) of Foreseeable Future Development Likely to Affect Shoreline Function	Potential Impacts to Shoreline Function
Vegetation	<ul style="list-style-type: none"> <li>• Infill in developed marine shoreline residential areas</li> <li>• New or expanded shoreline armoring associated with residential marine use</li> <li>• Continued and expanded agricultural use</li> <li>• More parks/public access sites</li> </ul>	<ul style="list-style-type: none"> <li>• Continued decrease in mature shoreline vegetation as clearing for new construction and other uses continues</li> <li>• Vegetation loss means greater potential for increased erosion, bank instability and accelerated bluff erosion, turbidity, higher nearshore water temperatures</li> <li>• Habitat loss for benthic community, less LWD for habitat forming processes</li> </ul>
Water Movement	<ul style="list-style-type: none"> <li>• New or expanded shoreline armoring and beach access structures associated with residential marine use</li> <li>• Docks, piers or floats</li> <li>• Creation of more parks/public access sites – construction of shoreline modifications associated with access and water recreation</li> </ul>	<ul style="list-style-type: none"> <li>• Further restriction in sediment flows and water movement as armoring continues; beach nourishment and feeder bluff processes altered and create need for further restoration efforts and enhancements</li> <li>• Reduction in LWD recruitment and other organic material as shoreline habitats are altered for residential and recreational use</li> <li>• Modification of flow regimes with construction of docks, ramps, or other recreational-use structures</li> <li>• Disruption of nearshore habitat, eel grass beds, critical saltwater habitat due to shoreline modifications</li> </ul>
Water Quality	<ul style="list-style-type: none"> <li>• Infill in developed marine shoreline residential areas</li> <li>• Continued and expanded agricultural use</li> <li>• Docks, piers or floats</li> </ul>	<ul style="list-style-type: none"> <li>• Increase in runoff and associated water quality impacts due to increased residential use and impervious surface area</li> <li>• Increase in runoff and associated water quality impacts due to increased agricultural uses</li> <li>• Water quality impacts associated with construction of docks and other in-water structures (e.g., spills, harmful materials use)</li> </ul>
Habitat	<ul style="list-style-type: none"> <li>• Infill in developed marine shoreline residential areas</li> <li>• Docks, piers or floats</li> <li>• New or expanded shoreline armoring associated with residential marine use</li> <li>• Continued and expanded agricultural use</li> <li>• More parks/public access sites</li> </ul>	<ul style="list-style-type: none"> <li>• Loss of or disturbance to riparian habitat during residential construction and use</li> <li>• Potential loss of or disturbance to riparian habitat during clearing for agricultural use</li> <li>• Potential damage to aquatic habitat via runoff from agricultural use</li> <li>• Disruption of nearshore habitat, eel grass beds, forage fish spawning areas, critical saltwater habitat</li> </ul>

**Table 15. Regulatory Offsets by Ecological Function, Water Type and Shoreline Use**

Shoreline Ecological Functions				SMP regulations providing protection for ecological functions	Water Type Specific	Shoreline Environment Specific	Use-Specific
Vegetation	Water Movement	Water Quality	Habitat				
<b>Notes:</b>  <u><b>Shoreline Ecological Functions</b></u> <b>Vegetation:</b> Erosion control, bank/bluff stabilization; temperature control; nutrient supply and uptake; runoff attenuation; LWD; habitat <b>Water movement:</b> Sediment distribution and beach nourishment; flood storage and attenuation; surface and groundwater exchange; <b>Water quality:</b> nutrient delivery; pollutant removal; temperature moderation; sediment trapping <b>Habitat:</b> diversity and structure supporting a broad range of species or a significant life cycle stage or process (rearing or migration)  <u><b>Shoreline Modifications:</b></u> Shoreline stabilization; piers and docks; fill; breakwaters, jetties, groins and weirs; dredging and spoil disposal; habitat enhancement.							
X	X	X	X	30.67.060(4) use of “innovative development design” requires shoreline variance	All	All	All
X	X	X	X	30.67.320(1) No net loss of shoreline ecological functions 30.62A.310(3) No net loss of critical area functions and values	All	All	All
X	X	X	X	30.67.320(2) Avoid , minimize and mitigate impacts to wetlands, fish and wildlife habitat and buffers 30.62A.310(3) Avoid, minimize, mitigate impacts to critical areas and buffers 30.62A.450 Avoid, minimize, mitigate impacts to critical species	All	All	All
	X	X		30.67.350 Alternatives proposed for protecting water quality, managing stormwater and preventing nonpoint pollution will be evaluated based on the shoreline environment management policies	All	All	All
	X	X		30.67.420 Prohibited uses – focuses on uses that represent contamination risk	All	All	Yes – see list in code section

Shoreline Ecological Functions				SMP regulations providing protection for ecological functions	Water Type Specific	Shoreline Environment Specific	Use-Specific
Vegetation	Water Movement	Water Quality	Habitat				
X	X	X	X	30.67.430 Allowed, Conditional and Prohibited Uses by shoreline environment – assignment depends on characteristics of the use and compatibility/sensitivity of the environment.	All	Yes – see table in code section	Yes – see table in code section
	X	X	X	30.67.440(4) Uses and modifications not allowed in critical salt water habitat	Marine	Aquatic	Yes – applies to all in-water modifications
X	X	X	X	30.67.440(5) Modifications are not permitted in Aquatic, Natural or Urban Conservancy unless part of restoration project. Where allowed, CUP required.	All	Aquatic, Natural, Urban Conservancy	Yes – applies to modifications
X	X	X	X	30.67.505(1)(a) New agricultural activities to use BMPs 30.62A.620 – Best management practices and/or farm plans required to protect wetlands and fish and wildlife habitat conservation areas 30.62B.520 – Best management practices and/or farm plans required to protect against erosion hazards	All	All	Agriculture
X	X	X	X	30.67.505(1)(b) and (c) provisions for manure lagoons and livestock flood sanctuaries require ecological evaluation and impact mitigation	All	AI	Agriculture
X	X	X	X	30.67.505(2) Manure lagoons and livestock flood sanctuaries prohibited	All	MWU, Natural, Aquatic	Agriculture
X	X	X	X	30.67.505(2) Agricultural activities restricted to passive only and CUP in Natural	All	Natural	Agriculture
	X		X	30.67.510(1)(a) New aquaculture activities must avoid critical saltwater habitat and accretion areas	Marine	All	Aquaculture
X	X	X	X	30.67.510(1)(b) Aquaculture to avoid loss of shoreline ecological functions	All	All	Aquaculture

Shoreline Ecological Functions				SMP regulations providing protection for ecological functions	Water Type Specific	Shoreline Environment Specific	Use-Specific
Vegetation	Water Movement	Water Quality	Habitat				
	X		X	30.67.510(1)(c) Limits on size of overwater aquacultural structures	All	Aquatic	Aquaculture
			X	30.67.510(1)(d) No introduced aquatic organisms w/out approval	All	Aquatic	Aquaculture
	X		X	30.67.510(1)(e) Shoreline modifications not allowed in conjunction with aquaculture	All	All	Aquaculture
X	X	X	X	30.67.510(1)(i) No storage or disposal of wastes w/in shoreline jurisdiction 30.67.515(1)d Boating Facilities (same provisions)	All	All	Aquaculture; Boating Facilities
		X		30.67.510(1)(j) and (k) Restrictions on use of use of toxic materials or finishes 30.67.515(1)(e) and (f) Boating Facilities (same provisions)	All	All	Aquaculture; Boating Facilities
X	X	X	X	30.67.510(2) Aquacultural uses are restricted in the more sensitive shoreline environments	All	Urban Conservancy, MWU, Natural, Aquatic	Aquaculture
			X	30.67.515(1)(b) No facility may be located in critical saltwater habitat or spawning areas for anadromous fish 30.67.530(1)(c) – similar provision for dredging 30.62A.330(2)(f) Docks, piers, floats to avoid critical saltwater habitat	All  Marine	All	Boating Facilities; Dredging
	X			30.67.515(1)(c) No facility (except mooring buoys) may be located in accretion areas	Marine	All	Boating Facilities
			X	30.67.515(1)(g) Construction timing limited by habitat factors; seasonal habitat concerns 30.62A.330(2)(f) Construction of docks, piers, floats shall avoid critical life cycle stages of fish and wildlife	All	All	Boating Facilities

Shoreline Ecological Functions				SMP regulations providing protection for ecological functions	Water Type Specific	Shoreline Environment Specific	Use-Specific
Vegetation	Water Movement	Water Quality	Habitat				
	X	X	X	30.67.515(1)(h) Marinas to be designed and located to minimize impacts	All	All	Boating Facilities: Marinas
	X	X	X	30.67.515(1)(j) Boat ramps to be designed and located to minimize impacts	All	All	Boating Facilities: Boat ramps
	X	X	X	30.67.515(1)(k) Docks, piers and floats to be designed and located to minimize impacts: placement, design, construction materials 30.62A.330(2)(f) Toxic or treated materials shall not come in contact with water	All	All	Boating Facilities: Docks, piers, floats
	X	X	X	30.67.515(2) Restrictions on use (CUP or prohibited) depending on environment	All	Urban Conservancy, MWU, Natural	Boating Facilities
	X			30.67.520(1)(a) In-water structures shall not adversely affect littoral drift, beach nourishment, channel migration, erosion rates, transport of debris, sediment, floodwaters	All	All	Breakwaters, jetties, groins
			X	30.67.520(1)(a) Allow fish passage	All	All	Breakwaters, jetties, groins
	X		X	30.67.520(2) Unless part of restoration project, use requires a CUP or is prohibited	All	Urban Conservancy, MWU, Natural	Breakwaters, jetties, groins



Shoreline Ecological Functions				SMP regulations providing protection for ecological functions	Water Type Specific	Shoreline Environment Specific	Use-Specific
Vegetation	Water Movement	Water Quality	Habitat				
X	X	X	X	30.67.525(2) Commercial uses are prohibited in the Urban Conservancy, MWU and Natural Environments; CUP required for overwater development when adjacent to other environments 30.67.555 Industrial (same provisions)	All	Urban Conservancy, MWU, Natural, Aquatic	Commercial; Industrial
	X		X	30.67.525(1)(c) Dredging and spoil disposal must address and mitigate impacts to habitat and water/sediment movement processes	All	All	Dredging
		X		30.67.525(1)(d) Deposition of dredge spoils must take into consideration the presence of contaminated sediments	All	All	Dredging; spoils
	X	X	X	30.67.525(2) Dredging requires CUP and only allowed for specific reasons	All	Aquatic	Dredging
	X	X		30.67.535(1)(b) When fill is allowed, it should be the minimum necessary; address erosion control and content	All	All	Fill
	X	X	X	30.67.535(2) Fill waterward of OHWM – content to be approved by county; allowed only under special circumstances; requires CUP unless part of restoration project	All	Aquatic	Fill
	X			30.67.540(1)(b) Limits use of structural flood protection measures 30.67.575(1)(b) Shoreline and bank stabilization (same provisions)	All	All	Flood Hazard Reduction; Shoreline stabilization
	X		X	30.67.540(1)(c) Removal of sediments for flood protection purposes is required to meet “no net loss” standard for ecological functions	All	All	Flood Hazard Reduction
	X			30.67.540(1)(d) Flood protection measures shall not interfere with natural hydraulic processes 30.67.575(1)(c) Shoreline and bank stabilization (same provisions)	All	All	Flood Hazard Reduction; Shoreline stabilization

Shoreline Ecological Functions				SMP regulations providing protection for ecological functions	Water Type Specific	Shoreline Environment Specific	Use-Specific
Vegetation	Water Movement	Water Quality	Habitat				
	X			30.67.540(1)(e) New dikes should be landward of associated wetlands and CMZ	All	All	Flood Hazard Reduction
X				30.67.545(1)(a) Timber harvest restricted within 200' of SSWS; selective logging, volume limits	All	All	Forestry
X	X	X	X	30.67.545(1)(c) Incidental forestry activities (ie., forest roads) must comply with most protective standards	All	All	Forestry
		X		30.67.545(1)(d) Restrictions on location of log storage; in-water storage must meet standards to protect bottom and prevent bark accumulation	All	All	Forestry
X	X	X	X	30.67.545(2)(b) Conversion of forest land subject to vegetation management requirements and "no net loss" standard	All	All	Forestry
X	X	X	X	30.67.555(2) Institutional uses require CUP in Urban Conservancy, Resource and Aquatic environments	All	Urban Conservancy; Resource; Aquatic	Institutional
X	X	X	X	30.67.555(2) Institutional uses are prohibited in Natural and MWU environments	All	MWU; Natural	Institutional
X	X	X	X	30.67.560(1)(a) Mining activities restricted to special circumstances and require CUP; 30.67.560(2)(b) Commercial mining prohibited in shoreline areas	All	All	Mining
	X	X	X	30.67.560(1)(b) Mining below the OHWM is limited by ecological standards: volume, timing, "no net loss", CMZ	Rivers	All	Mining
X	X	X	X	30.67.565(1)(b) Recreation uses to include enhancement of character	All	All	Recreation
			X	30.67.565(1)(c) Off-road vehicles not permitted on beaches, wetlands, fish and wildlife habitat conservation areas	All	All	Recreation

Shoreline Ecological Functions				SMP regulations providing protection for ecological functions	Water Type Specific	Shoreline Environment Specific	Use-Specific
Vegetation	Water Movement	Water Quality	Habitat				
X	X	X	X	30.67.565(2) Recreation uses limited in Resource and MWU; restricted to passive, low-intensity only in Natural and Aquatic	All	Resource; MWU; Natural; Aquatic	Recreation
X				30.67.570(1)(a) Cluster development required for residential subdivisions; open space preserved next to water	All	All	Residential
	X			30.67.570(1)(b) Structural flood and bank stabilization measures not allowed to protect new residences or residential lots.	All	All	Residential
X	X			30.67.570(1)(f) Stairs and ramps for beach access should be shared whenever possible; designed and located to prevent further need for shoreline modifications and vegetation removal.	Marine	All	Residential
X	X	X		30.67.570(1)(g) Residential subdivisions limited to 10% effective impervious surface.	All	All	Residential
X			X	30.67.570(2)(f)(iv) In Natural environment, alteration of topography and vegetation is minimum necessary to place buildings – no extra clearing allowed.	All	Natural	Residential
	X	X	X	30.67.575(1)(c) Comply with the guidelines for shoreline / bank stabilization in WDFW or DOE documents 30.62A.330(2)(b) same provisions found in critical area regulations	All	All	Shoreline stabilization
	X			30.62A.330(2)(b) Stabilization only allowed under limited circumstances; non-structural preferred; structural requires geotechnical study 30.62B.320(2) – similar provisions	All	All	Shoreline stabilization
	X			30.62A.330(2)(b) Avoid interrupting hyporheic zone continuity	All	All	Shoreline stabilization

Shoreline Ecological Functions				SMP regulations providing protection for ecological functions	Water Type Specific	Shoreline Environment Specific	Use-Specific
Vegetation	Water Movement	Water Quality	Habitat				
X	X	X	X	30.67.575(1)(c) Comply with “no net loss” standard	All	All	Shoreline stabilization
	X	X		30.67.575(1)(d) Construction location, fill and materials regulated to minimize impacts	All	All	Shoreline stabilization
X	X	X	X	30.67.580 Restoration is encouraged; return to historical conditions	All	All	Restoration
X	X	X	X	30.67.585(1)(a), (b), (j) and (k) New transportation and parking facilities should locate outside of shoreline jurisdiction or cross shoreline areas using the shortest route possible; locate on landward side of structures.	All	All	Transportation
	X		X	30.67.590(1)(c), (d), (e), (f) Allow for the free flow of water, sediment and LWD; use elevated, open pile or pier structures; fish-friendly design; not encroach on floodway 30.62A.330(2)(d) New road crossings should be fish-friendly and allow for downstream movement of sediment and woody debris.	All	All	Transportation
	X			30.67.590(2) Roads and bridges are prohibited in the Natural environment	All	Natural	Transportation
X	X	X	X	30.67.595(1)(a), (b) Locate utility facilities outside of shoreline jurisdiction; achieve “no net loss”; setback 200’ from OHWM	All	All	Utilities
X	X			30.62A.330(2)(c) Locate utilities in existing right-of-way corridors where feasible	All	All	Utilities
	X			30.67.595(1)(b) Underground facilities should not disrupt hyporheic exchange 30.62A.330(2)(c) - same provision 30.62A.330(2)(c) Overhead utilities allowed when no feasible alternative exists	All	All	Utilities

Shoreline Ecological Functions				SMP regulations providing protection for ecological functions	Water Type Specific	Shoreline Environment Specific	Use-Specific
Vegetation	Water Movement	Water Quality	Habitat				
		X	X	30.67.595(1)(b) When locating beneath water directional boring is preferred to excavation	All	All	Utilities
	X			30.67.595(1)(b) Locate utilities beneath river, stream, CMZ or attach to bridge or other existing structure 30.62A.330(2)(c) Bore beneath Type S and F streams and CMZ	River	All	Utilities
	X		X	30.67.595(1)(b) Utility facilities shall not be located on feeder bluffs or critical saltwater habitat	Marine	All	Utilities
	X		X	30.62A.330(2)(c) Utilities shall not increase or decrease natural rate of shoreline migration, sediment transport; or downstream movement of woody debris	All	All	Utilities
X				30.67.599(2) Vegetation removal shall be minimum necessary to accomplish use or modification; replant with native species	All	All	Vegetation
X	X	X	X	30.62A.320 Buffer retention required adjacent to streams, lakes, wetlands and marine waters <ul style="list-style-type: none"> <li>• Shoreline buffer = 150 feet</li> <li>• Wetland buffers = 25 – 300 feet</li> </ul>	All	All	All
	X	X		30.62A.320(1)(b) Buffers measured from OHWM or top-of-slope (when 33% or greater) plus 25 feet.	All	All	All
	X	X		30.62A.320(1)(c) Effective impervious surface limited to 10% within 300 feet of salmonid-bearing waters	All	All	All
X			X	30.62A.320(1)(d) Avoid damage to trees in buffers	All	All	All
X	X	X	X	30.62A.320(1)(e) Buffer width reductions allowed for separate tracts, fencing – improves long term protection for buffer	All	All	All
X	X	X	X	30.62A.320(1)(f) Buffer reductions allowed if critical area study demonstrates equivalent protection: buffer averaging, enhancement	All	All	All

Shoreline Ecological Functions				SMP regulations providing protection for ecological functions	Water Type Specific	Shoreline Environment Specific	Use-Specific
Vegetation	Water Movement	Water Quality	Habitat				
X	X	X	X	30.62A.320(2) Limited uses and activities allowed in buffers only if unavoidable and fully mitigated: <ul style="list-style-type: none"> <li>• utilities,</li> <li>• transportation structures,</li> <li>• stormwater management facilities,</li> <li>• access to allowed use,</li> <li>• pedestrian walkways and trails,</li> <li>• trimming for views (does not include removal)</li> <li>• bank stabilization and flood protection</li> <li>• reconstruction/replacement of existing structures</li> </ul> 30.62A.520 Special provisions for single-family on small lots – 4,000 sq.ft. exception, allowed intrusion into buffer	All	All	Yes – see list at left
X	X	X	X	30.62A.330(2)(a) Limited uses and activities allowed in streams, lakes and marine waters only if unavoidable and fully mitigated: <ul style="list-style-type: none"> <li>• Bank stabilization and flood protection</li> <li>• Utilities</li> <li>• Road crossings</li> <li>• Stream conveyances</li> <li>• Docks, piers and floats</li> </ul>	All	All	Yes – see list at left
	X			30.62A.330(2)(a) When allowed, new uses must be designed and located such that new bank stabilization, flood protection or maintenance dredging will not be required	All	All	All
	X			30.62A.330(2)(a) New uses or activities shall not obstruct source and movement of sediment from bluffs along marine shorelines	Marine	All	All



Shoreline Ecological Functions				SMP regulations providing protection for ecological functions	Water Type Specific	Shoreline Environment Specific	Use-Specific
Vegetation	Water Movement	Water Quality	Habitat				
	X			30.62A.330(2)(e) Stream conveyances shall avoid interrupting natural rates of downstream movement of woody debris and sediment	Rivers	All	All
	X	X	X	30.62A.340(1) Fill, stormwater discharges, septic systems and effective impervious surface prohibited in high quality wetlands	Wetlands	All	Yes – see list at left
	X	X	X	30.62A.340(3) Limited fill, stormwater detention, roads, utilities may be allowed if no alternative and fully mitigated.	Wetlands	All	Yes – see list at left
	X	X	X	30.62A.340(4)(a) Wetland mitigation requires greater than 1:1 replacement ratio	Wetlands	All	All
X		X	X	30.62A.340(4)(b) Wetland buffers may be reduced for high intensity land uses if habitat mitigation measures are used to mitigate for: lights, glare, noise, runoff, change in water regime, disturbance.	Wetlands	All	All
			X	30.62A.340(4)(b) As mitigation for high intensity land uses, buffers may be reduced in exchange for preservation of corridors between high quality wetlands	Wetlands	All	All
X	X	X	X	30.62A.350 Innovative development design may be used to accommodate water-dependent uses within the buffer provided that critical area study determines that protection is at least equivalent to standard buffer method. Method encourages use of LID. 30.67.060(4) Innovative development option requires shoreline variance permit.	All	All	Innovative development design
			X	30.62A.460 Habitat management plan for critical species required when located in primary association area.	All	All	All

Shoreline Ecological Functions				SMP regulations providing protection for ecological functions	Water Type Specific	Shoreline Environment Specific	Use-Specific
Vegetation	Water Movement	Water Quality	Habitat				
X	X	X	X	30.62A.510 Minor development activities required to use best management practices and all known and available reasonable technology to avoid, minimize and mitigate impacts. 30.62B.410 – similar provisions for geologic hazards	All	All	Minor development activities
X	X	X	X	30.62A.720 Monitoring impacts on critical areas, effectiveness of regulatory and non-regulatory programs, identify corrective actions if unmitigated impacts are observed.	All	All	All
X	X			30.62B.320(1)(a) Prevent erosion and landslide: <ul style="list-style-type: none"> <li>• Use best management practices</li> <li>• Prevent collection, concentration and discharge of stormwater</li> <li>• Minimize impervious surface</li> <li>• Retain vegetation</li> </ul>	All	All	All
	X		X	30.62B.320(1)(b) Development activity shall not increase risk of erosion or landslide by Increasing surface water discharge or adversely impact wetlands or fish and wildlife habitat conservation areas.	All	All	All
	X			30.62B.330(3) Development in CMZ limited only to removal of hazardous trees; new utility facilities; new roads or bridges if no alternative exists; normal maintenance or repair of existing structures; new flood protection and bank stabilization structures when otherwise allowed.	River	All	Yes – see list at left
		X		30.62B.340(1) No development in landslide hazard areas without geotech report indentifying and mitigating risks	All	All	All
X		X		30.62B.340(2) and (3) Setbacks required; retain vegetation; meet standards for construction, retaining walls, utility lines and pipes, stormwater discharge	All	All	All

Shoreline Ecological Functions				SMP regulations providing protection for ecological functions	Water Type Specific	Shoreline Environment Specific	Use-Specific
Vegetation	Water Movement	Water Quality	Habitat				
		X		30.62C.330 Prohibited uses in critical aquifer recharge areas	All	All	Yes – see list in code
	X	X		30.62C.340 Uses in critical aquifer recharge areas shall be conditioned as necessary to protect water quality	All	All	Yes – see list in code

#### 4.1.2 Subdivisions

Indirect impacts of the Proposed Program upon shoreline functions include the disturbance and potential environmental impacts associated with the construction of any new roads, utilities and other infrastructure to support residential and resource-related development. One of the primary ways of addressing this element would be through the following requirement (WAC 173-26-201(3)(d)(iii)):

*“...particular attention should be paid to policies and regulations that address platting or subdividing of property, laying of utilities, and mapping of streets that establish a pattern for future development that is to be regulated by the master program.”*

However, that same WAC section recognizes that one of the primary difficulties of the CIA is that there are, “practical limits when evaluating impacts that are prospective and sometimes indirect.” Subdivision potential was incorporated into the forecast model used to predict the number of new primary structures. The model included an analysis based on the minimum lot size under the predominant zoning in each reach and looked at both vacant and non-vacant properties large enough to subdivide. In rural areas, a density bonus of 35% was included consistent with the County’s rural cluster subdivision provisions. The model does not anticipate potential zoning changes, relying instead on current zoning conditions. To further analyze the potential impacts from subdivisions, a qualitative analysis was conducted examining how subdivisions would be regulated under the proposed SMP and other county policies (e.g., zoning requirements and County CAR) and how such regulations and policies would offset potential direct and indirect impacts to shoreline areas that may result from future subdivisions (Table 16).

Subdivisions are regulated most directly under Title 30, the Unified Development Code of the Snohomish County Code. Subtitle 30.2 contains the Zoning and Development Standards, which outline the different land use zones and types of uses allowed under each. It also contains chapters governing the general development standards such as density requirements, setbacks and other requirements as defined in the bulk matrix, and regulations related to subdivision infrastructure such as roads and access, parking, and landscaping.

Subtitle 30.41A contains the land use permitting requirements for subdivisions (defined in that subtitle as the subdivision of land into five or more lots, parcels, or sites), which include provisions for public notice and County Council review. This Subtitle includes the requirement that whenever a preliminary subdivision is wholly or partially located within an area subject to the jurisdiction of the Shoreline Management Act, the applicant must comply with all requirements of the SMP (30.41A.170).

The proposed SMP Shoreline Policies and Environment Designations contain several provisions applicable to future subdivisions, including:

- Areas with a Natural designation: Subdivision of property in a configuration that will require significant vegetation removal or shoreline modification that adversely impacts ecological functions is not allowed.
- Shoreline use element policies: Impervious surfaces in shoreline areas should be minimized; policies should encourage low impact development techniques.
- Residential shoreline use policies:

- Use of the rural cluster subdivision code is required consistent with the underlying zoning in all shoreline subdivisions to reserve substantial portions of land as open space and to provide passive recreation areas.
- Lots created through subdivision and/or shortplanning shall contain sufficient area, width and depth to ensure that development of the lots can occur without risk to structures from landslide or erosion.
- Geotechnical analysis of the site and an evaluation of shoreline characteristics prior to subdivision of land to assure that lots created will not require shoreline stabilization or the need for flood protection structures.

The proposed SMP regulatory language contains several references to subdivisions, all of which appear to be more restrictive in terms of where and how subdivisions can be created and constructed. The proposed SMP contains the following regulations for residential development in shorelines (SCC 30.67.570):

- (1) The following general regulations apply to residential uses in shorelines:
  - (a) Clustered development, with the open space area preserving and providing access to the water, is required for subdivisions or short subdivisions, except that alternative site designs may be considered by the department provided that the applicant demonstrates that the alternative site design will provide equivalent or better protection for shoreline ecological functions.
  - (b) Residential subdivisions, short subdivisions, or residential structures shall not be approved when structural flood protection or shoreline stabilization measures will be necessary to protect lots or subsequent development on the lots.
  - (c) All utility lines shall be located underground.
  - (d) Accessory structures that are not appurtenances must be proportional in size and purpose to the primary structure, and compatible with onsite and adjacent structures, uses and natural features.
  - (e) All residential subdivisions, short subdivisions, single family detached units, duplexes, townhouses or condominiums creating more than four parcels or dwelling units, and multi-family developments of more than four lots or dwelling units shall be required to provide public access under SCC 30.67.330.
  - (f) Beach or water access using new stairways and ramps is allowed provided the applicant demonstrates that:
    - (i) Existing shared, public or community facilities are not adequate or available for use;
    - (ii) The possibility of a multiple-owner or multiple-user facility has been thoroughly investigated and is not feasible; and
    - (iii) The stairway or ramp is designed and located such that:
      - (A) Subsequent shoreline modification, including the installation of shoreline stabilization, solely for the purpose of protecting the structure is not necessary;
      - (B) Removal or modification of existing shoreline vegetation is the minimum necessary to construct the structure, and will be replaced with appropriate native species within the next growing season; and
      - (C) No fill or other modification water-ward of the ordinary high water mark is necessary to construct or use the structure.
  - (g) Houseboats and floating homes are prohibited.

Snohomish County has also adopted the Low Impact Development (LID) Technical Guidance Manual for Puget Sound in Snohomish County Code (SCC) 30.63C.010. The LID Manual outlines alternatives for

meeting stormwater management requirements that, when applied at the subdivision scale, can encourage conservation and more closely mimic pre-development hydrologic functions.

The critical area regulations in SCC 30.62A also regulate proposed subdivisions that affect, among other areas, wetlands and fish and wildlife habitat conservation areas (including streams and saltwater habitat). These areas, obviously, often intersect with areas that fall under SMP jurisdiction. The CAR establishes standard buffer widths to protect riparian areas surrounding stream and wetland areas (SCC 30.62A, Part 300). The CAR also requires that a Habitat Management Plan (HMP) be prepared for any development activity, including subdivisions authorized by the SMP, that would affect primary association areas for critical species. The HMP must include provisions to reduce or eliminate the impact of the proposed development activities on any fish and wildlife habitat conservation area (SCC 30.62A.460).

It should also be noted that utilities and other infrastructure are not considered preferred uses of shorelines under the proposed SMP and would be allowed only when there are no other feasible options (SCC 30.67.595). In addition, since in many cases the areas of the greatest development potential are within areas that are already heavily developed, it is unlikely that significant additional infrastructure (e.g., major new highways or roads) would be required to support growth in these areas. Infrastructure under most of the foreseeable development conditions over the planning period would likely be more modest in scale (e.g., new arterial streets, additional sewer lines branching off main systems, etc.).



**Table 16. Potential Cumulative Impacts and Regulatory Offsets Associated with Subdivisions**

Shoreline Function	Potential Direct and Indirect Impacts to Shoreline Function	Proposed SMP and Other Regulatory Offsets (Regulatory Citations)
Vegetation	<p>Direct:</p> <ul style="list-style-type: none"> <li>Continued decrease in mature shoreline vegetation with clearing for new subdivisions</li> </ul> <p>Indirect:</p> <ul style="list-style-type: none"> <li>Loss of vegetation associated with roads and utilities needed to support subdivisions</li> </ul>	<p>Proposed Program:</p> <ul style="list-style-type: none"> <li>Areas with a Natural designation: Subdivision of property in a configuration that will require significant vegetation removal or shoreline modification that adversely impacts ecological functions is not allowed. (SCC 30.67.570(2)(f)(iv))</li> <li>Requirement for clustered development, with the open space area preserving and providing access to the water (SCC 30.67.570(1)(a))</li> <li>Buffer requirements and other shoreline development restrictions in local CAR – would apply to streams, lakes, and marine waters (SCC 30.62A.320 and 330)</li> <li>Restrictions on vegetation removal in geologically hazardous areas (SCC 30.62B.320(1)(iv), 30.62B.330(3)(a) and 30.62B.340(3)(a))</li> </ul>
Water Movement	<p>Direct:</p> <ul style="list-style-type: none"> <li>Further impairment of water movement and hydrologic function associated with dock/pier construction for subdivisions</li> <li>Shoreline modification and stabilization needed to support subdivisions</li> </ul> <p>Indirect:</p> <ul style="list-style-type: none"> <li>Shoreline modification and stabilization needed to support infrastructure triggered by subdivisions</li> </ul>	<p>Proposed Program:</p> <ul style="list-style-type: none"> <li>Geotechnical analysis of the site and an evaluation of shoreline characteristics prior to subdivision of land to assure that lots created will not require shoreline stabilization or the need for flood protection structures (SMP section 3.2.5.14, policy 3)</li> <li>Lots created through subdivision and/or shortplating shall contain sufficient area, width and depth to ensure that development of the lots can occur without risk to structures from landslide or erosion (SMP section 3.2.5.14, policy 2)</li> <li>Residential subdivisions or short subdivisions shall not be approved for which structural flood protection or shoreline stabilization measures will be necessary to protect lots or subsequent development on the lots (SMP section 3.2.5.14, policy 8)</li> <li>With only a few exceptions, development activity, including all subdivision, is prohibited in channel migration zones (SCC 30.62B.330(3))</li> <li>A single, joint use moorage facility shall be required of all new subdivisions, motels, and multi-family residences (SCC 30.67.515(i)(k)(vi))</li> <li>SCC 30.67.570(1)(a) and (b); 30.62A.330(2)(a) and (b); 30.62B.320(2); 30.62B.340(2)(a)(iii); and 30.62B.330(3)</li> <li>SCC 30.65 regulates development in flood plains – it is very difficult for a subdivision proposal to meet the requirements in this chapter.</li> </ul>
Water Quality	<p>Direct:</p> <ul style="list-style-type: none"> <li>Increase in runoff and associated water quality impacts with the creation of new impervious surfaces for residential use</li> </ul> <p>Indirect:</p>	<p>Proposed Program:</p> <ul style="list-style-type: none"> <li>Impervious surfaces in shoreline areas should be minimized; policies encourage low impact development techniques (SMP section 3.2.3, policy 13)</li> <li>LID provisions (SCC 30.63C.010)</li> <li>Impervious surface restrictions in local CAR (SCC 30.62A.320(1)(c), 30.62B.320(1)(a)(iv))</li> <li>Preserve buffers adjacent to aquatic shoreline resources (30.62A.320(1))</li> </ul>

	<ul style="list-style-type: none"> <li>Increased municipal stormwater discharge associated with increased development</li> </ul>	<ul style="list-style-type: none"> <li>Encourage use of LID techniques (SCC 30.62A.350)</li> <li>Mitigate impacts from stormwater runoff in erosion or landslide hazard areas (SCC 30.62B.320)</li> <li>Current county drainage regulations and expected regulatory updates pursuant to NPDES requirements.</li> </ul>
Habitat	<p>Direct</p> <ul style="list-style-type: none"> <li>Loss of or disturbance to riparian habitat during subdivision construction and use</li> </ul> <p>Indirect:</p> <ul style="list-style-type: none"> <li>Loss of riparian habitat due to sprawl associated with future subdivisions</li> <li>Loss of in-stream or nearshore habitat due to erosion or bank failure from increased development pressures</li> </ul>	<p>Proposed Program:</p> <ul style="list-style-type: none"> <li>Areas with a Natural designation: Subdivision of property in a configuration that will require significant vegetation removal or shoreline modification that adversely impacts ecological functions is not allowed (SCC 30.67.570(2)(f)(iv)).</li> <li>Lots created through subdivision and/or shortplating shall contain sufficient area, width and depth to ensure that development of the lots can occur without risk to structures from landslide or erosion (SMP section 3.2.5.14, policy 2)</li> <li>Geotechnical analysis of the site and an evaluation of shoreline characteristics prior to subdivision of land to assure that lots created will not require shoreline stabilization or the need for flood protection structures (SMP section 3.2.5.14, policy 3)</li> <li>Preference for clustered development, with the open space area preserving and providing access to the water (SCC 30.67.570(1)(a))</li> <li>Residential subdivisions or short subdivisions shall not be approved for which structural flood protection or shoreline stabilization measures will be necessary to protect lots or subsequent development on the lots (SCC 30.67.570(1)(b))</li> <li>Buffer requirements and other shoreline development restrictions in local CAR – would apply to lakes, streams and marine waters (SCC 30.62A.320(1))</li> <li>Habitat protection for critical species' primary association areas required (including listed terrestrial, fish and marine species) (SCC 30.62A, Part 400)</li> <li>Vegetation retention required in erosion and landslide hazard areas (SCC 30.62B.320(1)(a)(iv); 30.62B.330(3)(a); 30.62B.340(3)(a))</li> </ul>

### 4.1.3 Use Compatibility

WAC 173-26-201(3)(d)(ii) requires that the County conduct an analysis to estimate the future demand for shoreline space and potential use conflicts. Section 3 of this cumulative impact analysis characterizes current shoreline use patterns and projected trends to ensure appropriate uses consistent with the SMA. This section addresses potential use conflicts.

Land use conflicts are addressed at the planning level and again at the project level. At the planning level, land use conflicts are already addressed by the proposed SMP. The SMP shoreline environment designations and the uses allowed within each shoreline environment are based on several factors: the comprehensive land use plan and zoning, existing development patterns and ecological functions and conditions. Land use conflicts are addressed by the comprehensive land use plan and zoning classifications. The comprehensive plan establishes guidelines to determine compatibility and location of use zones. Use compatibility is a key factor when determining which types of uses and activities belong in which areas. At the planning level, use compatibility is addressed by grouping similar uses into specific areas and by adjusting the scale of those uses to best fit into their surroundings.

At the project level, development standards are used to reduce potential conflicts between neighboring uses. Structural setbacks and buffers, building design and height, visual screening and landscaping, use restrictions addressing objectionable elements (i.e., noise, dust, odor, exterior lighting, hours of operation, traffic and parking) can be regulated to improve compatibility between different land use types.

#### **Addressing Use Conflicts in the SMP**

The proposed SMP addresses potential use conflicts by identifying preferred uses, grouping uses by type into specific locations by shoreline environment designations and by prohibiting a set of potentially objectionable uses from the County's shoreline jurisdiction. Non-conforming uses that may be incompatible with the shoreline environment in which they are located have limited opportunity to expand or continue in perpetuity. To reduce potential conflicts the SMP contains the following provisions:

- SCC 30.67.420 Non-water dependent uses that present a water quality risk and are potentially objectionable to neighboring uses are prohibited in shoreline jurisdiction.
- SCC 30.67.430 Allowed uses are grouped by type into specific shoreline environment designations and standards are applied to ensure that the uses are compatible with the environment and with neighboring uses.
- SCC 30.67.450 Non-conforming uses have a limited ability to expand and continue indefinitely.
- SCC 30.67.460 Bulk standards are applied to limit building height, require setbacks and reduce lot coverage to reduce potential impacts on neighboring properties.
- SCC 30.67.525 Commercial uses are limited to areas where commercial zones already exist to ensure that similar uses are located together.
- SCC 30.67.599 Vegetation management policies and regulations indirectly improve use compatibility by providing visual screening and preserving a natural setting.
- SCC 30.44.130 Conditions can be applied to all shoreline permits to ensure compliance with the goals and policies of the SMA, including resolving use conflicts by applying the priorities established in WAC 173-26-201(2)(d).

- SCC 30.44.140 Standards for approval of a shoreline conditional use permit require that uses and activities be compatible with their surroundings.
- SCC 30.44.150 Standards for approval of a shoreline variance require that uses and activities be compatible with their surroundings.

In addition to the regulations above, the permit review and SEPA processes require public notification and allow for public comments often resulting in discussion of land use compatibility issues and imposition of mitigation measures designed to reduce conflicts.

### **Other regulatory standards that address potential land use conflicts**

Land use conflicts may occur between uses within shoreline jurisdiction or between uses that are adjacent to shorelines. The County zoning code and development standards in Title 30 SCC address land use conflicts for all unincorporated areas regardless of location inside or outside shoreline jurisdiction. The following examples addressing use compatibility are taken from the County's development codes and are not included as part of the proposed SMP but could be applied to reduce or eliminate conflicts with development in shoreline areas.

- Chapter 30.31A SCC addresses standards for development in the Business Park, Planned Community Business, Neighborhood Business, Industrial Park zones:
  - Processes and Equipment. Processes and equipment employed and goods processed or sold shall be limited to those which are not objectionable beyond the boundaries of the lot upon which the use is located by reason of offensive odors, dust, smoke, gas, or electronic interference;
  - Building Design. Buildings shall be designed to be compatible with their surroundings, both within and adjacent to the zone;
  - Restrictive Covenants. Restrictive covenants shall be provided which shall ensure the long-term maintenance and upkeep of landscaping, storm drainage facilities, other private property improvements, and open space areas and facilities.
  - Noise. Noise levels generated within the development shall not exceed those established in chapter 10.01 SCC - noise control, or violate other law or regulation relating to noise. Noise of machines and operations shall be muffled so as to not become objectionable due to intermittence or beat frequency, or shrillness;
  - In the BP zone, all outdoor lighting shall conform to the unified architectural lighting scheme for the BP development and shall not shine on adjacent properties;
  - For placement of new single-family and multiple family dwellings in the BP zone, the director may require additional buffering, setbacks, landscaping, or other design features to maximize compatibility between residential and commercial/industrial uses, and between single family and multiple family uses;
- Chapter 30.31B SCC addresses standards for development in the Freeway Service and General Commercial Zones:
  - Each development shall be permanently screened from adjoining and contiguous residential areas or zone by a wall, fence, greenbelt, or other enclosure approved by the hearing examiner of minimum height of four feet and maximum height of seven feet. No signs shall be permitted on any part of a screening enclosure unless equivalent

screening is provided by existing parks, parkways, recreational area, or by topography or other natural conditions. No screening shall be required when abutting existing parks, parkways, recreational area, or by topography or other natural conditions.

- Chapter 30.31F SCC addresses standards for development in the Rural Business, Rural Industrial, Rural Freeway Service, and Clearview Rural Commercial zones:
  - Adequate water supplies shall be demonstrated for fire protection;
  - Stormwater detention facilities such as ponds and grass swales shall be designed whenever possible as to integrate them into the overall site design and required landscaping and buffers on the site;
  - Signage shall be consistent with the provisions of SCC 30.27.010 to 30.27.090;
  - Refuse collection, fuel loading, and above ground fuel storage areas, and large truck parking areas shall be located at least 100 feet from residential uses or designations and shall be screened in accordance with the landscaping requirements for outdoor storage and solid waste areas contained in SCC 30.25.024
  - In the RB zone: (1) The total impervious surface of all buildings, parking, and other support areas such as storage, trash containers, etc., shall not exceed 50 percent of the net usable area of the site; and (2) The maximum area for each building footprint on the site shall not exceed 4,000 square feet.
- Chapter 30.25 SCC addresses standards for landscaping:
  - To reduce incompatible characteristics of abutting properties with different zoning classifications, the minimum designated landscape width and type shall be required as a buffer between uses pursuant to SCC Table 30.25.020(1) or as required in SCC 30.25.030(3), unless exempted pursuant to SCC 30.25.020(4). For properties within urban zones that are separated from properties in rural zones only by public or private roads or road right-of-way, the minimum landscape requirements of SCC Table 30.25.020(1) shall also be required unless exempted pursuant to SCC 30.25.020(4). When a development proposal has multiple uses or dwelling types, the most intensive use or dwelling type within 100 feet of the property line shall determine which perimeter landscaping requirements shall apply.
  - Properties zoned RFS, CRC and RB shall provide a 50 foot Type A perimeter landscape buffer when adjacent to R-5, RD, RRT-10, A-10, F, F and R and Mineral Conservation. Properties zoned RI shall provide a 100 foot Type A perimeter landscape buffer when adjacent to R-5, RD, RRT-10, A-10, F, F and R and Mineral Conservation.
- Chapter 30.23 SCC establishes bulk regulations addressing structural setbacks, lot coverage, building height, and special setbacks for certain uses where additional separation between uses may improve compatibility.
- Chapter 30.32A, B and C SCC contain standards for improving compatibility between resource and residential uses including special setbacks for structures and notification for residents of on-going resource uses nearby.

## 4.2 Other Regulatory Offsets

In addition to the requirements contained within the proposed SMP, development within Snohomish County is subject to other local, state, and federal requirements that aim to protect shoreline functions and, in effect, promote the “no net loss” standard. Following is a list of the types of regulations outside the Proposed Program that may act to offset some of the potential impacts of future development.

- **Local Zoning:** For impacts that may be caused by changes in zoning that may lead to increased development options (e.g., in the 273 acres of marine shoreline area that will change from Conservancy to Rural Conservancy), the County has other zoning regulations that will provide some degree of environmental protection. For example, provisions in SCC 30.22.100, 30.22.110, and 30.22.120 specify certain types of land uses that are either a permitted or conditional use within areas zoned rural, urban, resource lands.
- **State Requirements – State Environmental Policy Act (SEPA) and Washington Department of Fish and Wildlife (WDFW) Hydraulic Project Approvals (HPAs):** Projects within Snohomish County that trigger the requirements of 197-11 WAC that implement SEPA must undergo an environmental review in the form of an environmental checklist. The checklist is used by local and state regulatory agencies as well as the public to determine the environmental significance of the proposed action and, if necessary, conduct additional environmental reviews (e.g., an Environmental Impact Statement) or develop mitigation measures to offset any impacts. The WDFW requires any construction activity that will use, divert, obstruct, or change the bed or flow of state waters to obtain an HPA to minimize adverse impacts to fish and shellfish in marine or other shoreline areas (Chapter 220-110 WAC).
- **Federal Requirements – Clean Water Act (CWA), National Environmental Policy Act (NEPA), and Endangered Species Act (ESA):** The CWA contains provisions to restore and maintain the quality of the nation’s water. Sections most relevant to maintaining the “no net loss” provisions of the Proposed Program include: Section 303(d), which establishes a list of water bodies that do not meet state water quality standards, the National Pollutant Discharge Elimination System (NPDES), which administers permits under the CWA and enforces its pretreatment requirements for stormwater systems, and Section 404 (implemented by the Army Corps of Engineers) requires a permit before dredged or fill material may be discharged into waters of the United States, unless the activity is exempt from Section 404 regulation (e.g., certain farming and forestry activities). The NEPA is a federal version of the SEPA for projects with federal jurisdiction. The ESA requires site-specific review, approval and conservation measures associated with any project that holds the potential to harm a threatened or endangered wildlife species or their habitats. There are a total of 10 federal and state listed threatened and endangered wildlife species known or presumed to exist in Snohomish County, including several that rely upon lake, river or marine shoreline areas (Snohomish County 2006a).

Based on the types of foreseeable development that are likely to occur within Snohomish County and the existing components of the proposed SMP, it appears that potential impacts to shoreline function will be adequately addressed. No additional requirements are recommended at this time.



### 4.3 Non-Regulatory Offsets

There are several County-wide planning efforts currently underway that seek to provide protections for shoreline functions. Such efforts may also serve to offset some of the development related impacts to lakes, rivers and marine systems in the County. These non-regulatory programs are shown in Table 17 and described in more detail below. The County also identifies other appropriate non-regulatory offsets within the context of the restoration plan that is a required element of the SMP update process and in the SEIS.

Offsets associated with potential impacts of small-scale development exempt from permitting (Section 3.3.1) include state and local programs that promote native vegetation, pesticide-free residential zones, backyard habitat, and fencing of livestock areas. In addition, local utilities that provide water conservation tips as part of their regular services will help to reduce water-intensive practices at the residential level.

#### Non-Regulatory Offsets

Snohomish County supports a variety of non-regulatory programs. The continued support of these programs is an important component of a comprehensive protection and restoration strategy. Non-regulatory programs include: planning and intergovernmental coordination; public education and stewardship; incentive programs; purchase and acquisition programs; monitoring and adaptive management; and restoration and enhancement projects. The following is a description of some of these non-regulatory programs.

##### Planning and Intergovernmental Coordination

The County participates in multiple intergovernmental and stakeholder planning efforts including WRIA planning, SIRC, Puget Sound Partnership, Marine Resources Committee, The Ruckelshaus Center, and Agricultural Advisory Board. The County pursues partnerships with the Cascade Land Conservancy, state agencies (WDFW, DNR, DOE), WSU Beach Watchers, Stillaguamish Tribe, Tulalip Tribes, People for Puget Sound, City of Everett, City of Edmonds, City of Mukilteo, City of Arlington, Streamkeepers, Adopt-a-Stream and others.

Snohomish County is participating in a regional salmon recovery planning initiative known as the “**Shared Strategy for Puget Sound.**” The Shared Strategy initiative includes 14 watershed salmon recovery planning groups, federal, state, and local governments, as well as private business and interest groups. The goal of the Shared Strategy is to create a regional salmon recovery plan that serves to protect and enhance habitat features essential to salmonid species.

In addition, several watershed plans have been developed for different watershed or **Water Resources Inventory Area** by various watershed planning groups as well as the Snohomish County Public Works Surface Water Management Division. These plans focus on salmonid, and particularly Chinook salmon, survival, but also provide a general assessment of the shoreline ecological functions in Snohomish County and help inform efforts to preserve these functions. These types of efforts also suggest several proposed restoration projects and areas with potential for restoration within shoreline jurisdiction (Snohomish County 2006a).

## Public Education and Stewardship

**Northwest Stream Center** – The County supports and provides facilities for the educational programs provided by the Adopt-a-Stream Foundation and the Northwest Stream Center at McCollum Park. This is a regional environmental education and interpretive facility that focuses on stream and wetlands ecology and fish and wildlife habitat restoration (2007 Snohomish County Comprehensive Parks Plan).

The **Salmon Watch** field experiences focus on educating teachers, students and parents about salmon in local streams. Classes in this program travel to a local salmon spawning stream where they see – often for the first time – salmon migrating to their spawning beds (Snohomish County Surface Water Management Division Website 2009).

The **Salmon and Plants for Kids** program uses streamside restoration and a series of three fieldtrips to teach how native plants improve water quality and wildlife habitat. Students in this program plant and monitor a stream restoration site and assist SWM's Native Plant Program by potting plants at the nursery or salvaging plants from construction sites. These plants are re-planted by students the following year (Snohomish County Surface Water Management Division Website 2009).

The **Native Plant Program** trains volunteers to identify and salvage native plants from areas where they would otherwise be destroyed due to development, roads, or other activities. The salvaged plants are taken to our native plant holding facility for about a year then they are transplanted to stream and riverbanks where they help improve water quality and fish habitat.

The goals of the **Watershed Stewards Program** include facilitating voluntary BMPs by property owners, implementing watershed improvement projects and maintaining community partnerships in areas of mutual concern and benefit. Stewards work with property owners and other stakeholders to identify and target water resource improvements, provide technical assistance and project implementation. Areas of steward emphasis include: Stillaguamish CWD, Snohomish WMA, South County WMA, Marine Resources, and Agricultural Outreach.

The **Education Programs** such as the **Watershed Education Program** and **Shore Stewards Program** seeks to educate shoreline residents about the issues pertinent to shoreline and encourage them to be responsible landowners. The programs help citizens understand the natural processes and adopt watershed- and salmon-friendly actions such as: planting native vegetation along stream banks, teaching others in their community about water and fish issues, collecting and sharing data, raising funds, understanding land use and regulatory processes as they relate to aquatic habitat, water quality, urban drainage and river flooding. Events offered by the Watershed Education Program are designed to help citizens protect and restore aquatic habitat and water quality, and deal with urban drainage problems and river flooding. The county partners with Puget Sound Partnership, WSU Beach Watchers, Snohomish County Public Works, Stillaguamish Tribe, Tulalip Tribes, People for Puget Sound, and Rosary Heights Nunnery, City of Everett, City of Edmonds, City of Mukilteo, and others to conduct **Landowner Workshops**. The half-day workshops educate shoreline landowners on issues such as landslides, vegetation on slopes, natural lawn care, and low impact development.

The **Lake Management Program** provides a variety of lake monitoring and management services, including monitoring the water quality of lowland lakes, conducting detailed lake restoration studies, taking actions to control invasive aquatic plants, providing public education, volunteer monitoring and technical assistance to lake groups and lakeside residents, preparing reports analyzing the condition of county lakes.

The **Marine Resources Management Program's** primary goal is to protect and restore the marine waters, habitats, and species off the shores of Snohomish County. We investigate marine resource-related concerns and recommend remedial actions to local authorities and property owners. County Surface Water Management staff are available to provide technical assistance, advice and ideas to shoreline landowners on issues related to: bluff management, bulkheads and softshore armoring, riparian vegetation, marine life, water quality and beach restoration (Snohomish County Surface Water Management Division Website 2009).

### **Incentive Programs**

**Open Space / Current Use Property Tax Program.** The County has adopted policies and designation criteria<sup>1</sup> to implement chapter 84.34 RCW, providing reduced property taxes for lands maintained in natural condition. Stream corridors, lake and saltwater shorelines, wetlands, wildlife habitat, riparian areas, steep slopes, and areas supporting unique or rare plant communities are all potentially eligible for inclusion in this tax incentive program.

**TDR / PRD Programs.** The County has initiated Transfer of Development Rights and Purchase of Development Rights programs. These programs are primarily designed to preserve agricultural lands for long-term agricultural production. Preservation of prime agricultural lands in the County ensures that development potential and adverse impacts to natural floodplain processes in the major river valleys are minimized in these areas. Forest resource lands are also eligible for TDR. Development potential is transferred to receiving areas which can support the increased density. Criteria for determining appropriate receiving areas includes planned densities, service availability and environmental constraints posed by natural features like slopes and soils, or the presence of streams and wetlands.

### **Purchase and Acquisition**

**Resource Land Conservation** – Snohomish County has taken the lead in resource protection for the past 30 years by purchasing over 9,000 acres of parklands. The past and current comprehensive park plans highlight the need and importance of preserving key natural areas for the benefit of future generations. As a result there are many county parklands that are undeveloped sensitive environmental areas, and many with important natural areas (2007 Snohomish County Comprehensive Parks Plan). Some of the most important properties acquired with potential for preservation and restoration of natural areas include waterfront areas in Robe Canyon, Snohomish Estuary, Lord Hill Park, Bob Heirman Wildlife Preserve, River Meadows, Cicero Ponds, Lake Cassidy, Kayak Point, and O'Reilly Acres.

### **Monitoring and Adaptive Management**

The County has developed a monitoring program to assess the level of success achieving the “no net loss” standard for ecological functions. Ecological indicators will be monitored along with development activities and mitigation measures. If it is determined that ecological functions have diminished over time, an assessment will be made to determine the cause(s) and identify the appropriate action necessary to restore the ecological balance. The County will be looking for potential failed or inadequate mitigation, failure to fully implement the regulatory requirements, or regulations which do

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<sup>1</sup> Adopted policies and designation criteria for participation in the County's tax incentive program are found in SCC 4.28.030 and .040 respectively.

not achieve the required standard. The County may utilize enforcement, regulatory changes, increased capital restoration and acquisition efforts, and education and incentive programs.

### **Restoration and Enhancement Projects**

The individual WRIA salmon conservation plans, findings of the Marine Resources Advisory Committee, Noxious Weed Control Board, Snohomish County Lake Management Program and the Drainage Needs Reports have all identified a number of proposed restoration projects. Implementation and construction of these proposed restoration projects are carried out by the respective county, municipalities, or tribes identified as the lead for the proposed restoration projects. Other organizations and individuals are also involved in restoration. These include the Tulalip and Stillaguamish Tribes, the Snohomish Conservation District, the Cascade Land Conservancy, the Stilly-Snohomish Fisheries Enhancement Task Force, other non-profit organizations, and private landowners. In addition, State and Federal agencies such as the Washington State Department of Fish and Wildlife, the US Fish and Wildlife Service, and others may be involved in direct project implementation, or as partners in multi-jurisdictional efforts. Within Snohomish County, the Department of Public Works, Surface Water Management Division, is the lead for implementing, designing, and constructing proposed restoration projects.

The County has prepared a separate document entitled, *The Restoration Element*, to comply with the requirements in WAC 173-26-186(8)(c). *The Restoration Element* describes the County's restoration goals and policies and the capital restoration projects funded in the County budget and projects recommended for future consideration.

**Table 17. Non-Regulatory Offsets by Water Type**

Function	Lakes	Rivers	Marine
Vegetation	<ul style="list-style-type: none"> <li>Public education programs to encourage riparian re-planting (e.g., Snohomish County Surface Water Management Division's Watershed Education Program)</li> <li>Conservation easements offered to farmers under Purchase of Development Rights (PDR) pilot program</li> <li>Possible future implementation of metrics (e.g., percent riparian vegetation retained) to establish future no net loss standards</li> <li>Locally based watershed restoration projects (as identified in Shared Strategy, SEWIP, other planning documents)</li> </ul>	<ul style="list-style-type: none"> <li>Public education programs for individual landowners (e.g., Snohomish County's Landowner Guide to Streamside Living)</li> <li>Conservation easements offered to farmers under Purchase of Development Rights (PDR) pilot program</li> <li>Possible future implementation of metrics (e.g., percent riparian vegetation retained) to establish future no net loss standards</li> <li>Locally based watershed restoration projects (as identified in Shared Strategy, SEWIP, other planning documents)</li> <li>Habitat restoration projects, interjurisdictional partnerships and watershed planning (WRIA plans and restoration priorities)</li> </ul>	<ul style="list-style-type: none"> <li>Public education programs to encourage riparian re-planting (e.g., Snohomish County Surface Water Management Division's Watershed Education Program)</li> <li>Locally based watershed restoration projects (as identified in Shared Strategy, SEWIP, other planning documents)</li> <li>Conservation easements offered to farmers under Purchase of Development Rights (PDR) pilot program</li> <li>Riparian habitat mapping/restoration projects by Snohomish County Surface Water Management Division's Marine Resources Program (e.g., vegetation monitoring survey)</li> <li>Possible future implementation of metrics (e.g., percent riparian vegetation retained) to establish future no net loss standards</li> </ul>
Water movement	<ul style="list-style-type: none"> <li>Public education programs to encourage understanding of drainage processes (e.g., Snohomish County Surface Water Management Division's Watershed Education Program)</li> <li>Green Shorelines handbook on soft shore alternatives to bulkheads</li> </ul>	<ul style="list-style-type: none"> <li>Public education programs to encourage understanding of drainage processes (e.g., Snohomish County Surface Water Management Division's Watershed Education Program)</li> </ul>	<ul style="list-style-type: none"> <li>Public education programs to encourage understanding of drainage processes (e.g., Snohomish County Surface Water Management Division's Watershed Education Program)</li> </ul>
Water Quality	<ul style="list-style-type: none"> <li>Low-impact development projects (e.g., those designed/implemented by Sustainable Snohomish County)</li> <li>Public education/ assistance campaigns designed to minimize pollution inputs (e.g., Snohomish County Surface Water management stewards)</li> <li>Education/assistance programs for agricultural landowners (through Snohomish Conservation District)</li> <li>Invasive plant removal projects and public education to reduce proliferation and spread to other lakes</li> </ul>	<ul style="list-style-type: none"> <li>Low-impact development projects (e.g., those designed/implemented by Sustainable Snohomish County)</li> <li>Public education/ assistance campaigns designed to minimize pollution inputs (e.g., Snohomish County Surface Water management stewards)</li> <li>Education/assistance programs for agricultural landowners (through Snohomish Conservation District)</li> </ul>	<ul style="list-style-type: none"> <li>Low-impact development projects (e.g., those designed/implemented by Sustainable Snohomish County)</li> <li>Public education/ assistance campaigns designed to minimize pollution inputs (e.g., Snohomish County Surface Water management stewards)</li> <li>Education/assistance programs for agricultural landowners (through Snohomish Conservation District)</li> </ul>
Habitat	<ul style="list-style-type: none"> <li>Restoration projects (e.g., those identified through Shared Strategy, Stillaguamish Clean Water District Board, etc.)</li> </ul>	<ul style="list-style-type: none"> <li>Conservation easements offered to farmers under Purchase of Development Rights (PDR) pilot program</li> </ul>	<ul style="list-style-type: none"> <li>Restoration projects (e.g., Shared Strategy, Stillaguamish Clean Water District Board, etc.)</li> </ul>

	<ul style="list-style-type: none"> <li>• Public education programs to encourage protection and restoration of shoreline habitat (e.g., Snohomish County Surface Water Management Division's Watershed Education Program)</li> <li>• Conservation easements offered to farmers under Purchase of Development Rights (PDR) pilot program</li> <li>• Possible future implementation of metrics (e.g., percent riparian vegetation retained) to establish future no net loss standards</li> </ul>	<ul style="list-style-type: none"> <li>• Restoration projects (e.g., those identified through Shared Strategy, Stillaguamish Clean Water District Board, etc.)</li> <li>• Public education programs to encourage protection and restoration of shoreline habitat (e.g., Snohomish County Surface Water Management Division's Watershed Education Program)</li> <li>• Possible future implementation of metrics (e.g., percent riparian vegetation retained) to establish future no net loss standards</li> <li>• Conservation easements to flood farmlands for benefit of waterfowl, flooded fallow rotation improves nitrogen content, facilitates "organic" certification</li> </ul>	<ul style="list-style-type: none"> <li>• Public education programs to encourage protection and restoration of shoreline habitat (e.g., Snohomish County Surface Water Management Division's Watershed Education Program)</li> <li>• Possible future implementation of metrics (e.g., percent riparian vegetation retained) to establish future no net loss standards</li> <li>• Nearshore and riparian habitat mapping/restoration projects by Snohomish County Surface Water Management Division's Marine Resources Program (e.g., eelgrass mapping, creosote log survey &amp; removal)</li> <li>• Conservation easements offered to farmers under Purchase of Development Rights (PDR) pilot program</li> </ul>
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## 4.4 No Net Loss of Shoreline Ecological Functions

The shoreline guidelines explain the dichotomy that exists within the SMA: preserve the shorelines for water-dependent uses and provide for public access and recreation all while protecting and restoring natural shoreline ecological functions.

WAC 173-26-176(2) The policy goals for the management of shorelines harbor potential for conflict. The act recognizes that the shorelines and the waters they encompass are "among the most valuable and fragile" of the state's natural resources. They are valuable for economically productive industrial and commercial uses, recreation, navigation, residential amenity, scientific research and education. They are fragile because they depend upon balanced physical, biological, and chemical systems that may be adversely altered by natural forces (earthquakes, volcanic eruptions, landslides, storms, droughts, floods) and human conduct (industrial, commercial, residential, recreation, navigational). Unbridled use of shorelines ultimately could destroy their utility and value. The prohibition of all use of shorelines also could eliminate their human utility and value. Thus, the policy goals of the act relate both to utilization and protection of the extremely valuable and vulnerable shoreline resources of the state. The act calls for the accommodation of "all reasonable and appropriate uses" consistent with "protecting against adverse effects to the public health, the land and its vegetation and wildlife, and the waters of the state and their aquatic life" and consistent with "public rights of navigation." The act's policy of achieving both shoreline utilization and protection is reflected in the provision that "permitted uses in the shorelines of the state shall be designed and conducted in a manner to minimize, in so far as practical, any resultant damage to the ecology and environment of the shoreline area and the public's use of the water." [RCW [90.58.020](#).]

WAC 173-26-186(8)(b) requires that local master programs adopt policies and regulations designed to achieve "no net loss" of shoreline ecological functions. WAC 173-26-186 further acknowledges that the policies of the Shoreline Management Act, implemented by the policies of master programs, may not be achievable by development regulation alone and provides for reasonable discretion at the local level to balance the policy goals in the guidelines in light of other relevant local, state and federal regulatory and non-regulatory programs [WAC 173-26-186(5) and (9)].

As described in section 4.1, 4.2 and 4.3 of this cumulative impact analysis, the County utilizes both regulatory and non-regulatory programs to protect shoreline ecological functions. In its comprehensive plan, the County has adopted a multifaceted approach to protect the natural environment. This multifaceted approach includes planning; intergovernmental coordination; development of regulation; enforcement; and improved protection of ecological functions and values through non-regulatory incentive-based means, such as voluntary enhancement and restoration, public education and other voluntary activity; and monitoring and adaptive management. The plan provides policies in each of these areas to direct the county's efforts to protect the natural environment of Snohomish County and to achieve the outcome of no net loss of functions and values to the extent mandated by state law.

When taken all together, implementation of the regulatory and non-regulatory programs is expected to achieve the "no net loss" standard. A monitoring program has been developed to assess the effectiveness of this multifaceted approach. Projects employing variable standards for critical area protection will be individually tracked by the monitoring program.

### 4.4.1 The SMP Regulations and No Net Loss

In the proposed SMP, shoreline ecological functions are protected by controlling the types and intensities of shoreline uses through implementation of the shoreline environment-specific regulations. The types of allowed uses and the design standards for specific uses are tailored to the specific ecological conditions – the more sensitive and fragile the ecology within the shoreline environment, the more restrictive the development standards.

In addition to limiting the types and intensity of shoreline development through the Shoreline Management Program, the County's critical area regulations also apply. The critical area regulations are based on a scientific foundation recommending a range of acceptable protection measures to mitigate potential impacts from the "best available science", as defined pursuant to the Growth Management Act. Since critical areas include lakes, streams, wetlands and marine waters, the "functions and values" of these critical areas are equivalent to the "ecological functions of shorelines". Table 18 compares the functions and values of critical areas from the County's BAS, *Revised Draft Summary of Best Available Science for Critical Areas, March, 2006*, as adopted by the County into the critical area regulations with the ecological functions of shorelines from WAC 173-26-201(3)(d)(i)(C).

The County has adopted critical area regulations which meet the requirements for best available science as required under the GMA (*Pilchuck Audubon and Futurewise v. Snohomish County, CPSGMHB, Case 07-3-0033, Final Decision and Order, April 1, 2008, page 9-10*). The state Supreme Court acknowledges that, "t(T)he SMA , with its goal of balancing use and protection, is less burdensome" (*Futurewise, et. al. v. City of Anacortes, Supreme Court of the State of Washington, No. 80396-0, En Blanc, filed July 31, 2008, page 3*).

**Table 18. Comparison of “critical area functions and values” and “shoreline ecological functions”**

<b>Critical Areas, Shorelines &amp; Buffers</b>	<b>GMA Critical Area Functions &amp; Values [SCC 30.62A.220]</b>	<b>SMA Shoreline Ecological Functions [WAC 173-26-201(3)(d)(i)(C)]</b>
<b>Streams</b>	Fish and wildlife habitat; transport of water, sediment and organic material; floodwater storage and attenuation;	Hydrologic: Transport of water and sediment across the natural range of flow variability; attenuating flow energy; developing pools, riffles, gravel bars, recruitment and transport of large woody debris and other organic material.  Habitat for native aquatic and shoreline-dependent birds, invertebrates, mammals; amphibians; and anadromous and resident native fish.
<b>Wetlands</b>	Fish and wildlife habitat, pollution assimilation, sediment retention, shoreline stabilization, floodwater storage, attenuation and conveyance, wave energy attenuation, stream base-flow maintenance, and groundwater discharge/recharge;	Hydrological: Storing water and sediment, attenuating wave energy, removing excessive nutrients and toxic compounds, recruiting woody debris and other organic material.  Habitat for aquatic and shoreline-dependent birds, invertebrates, mammals; amphibians; and anadromous and resident native fish.
<b>Lakes</b>	Fish and wildlife habitat, sediment retention, pollution assimilation, and floodwater attenuation, storage and conveyance;	Hydrologic: Storing water and sediment, attenuating wave energy, removing excessive nutrients and toxic compounds, recruitment of large woody debris and other organic material.  Habitat for aquatic and shoreline-dependent birds, invertebrates, mammals; amphibians; and anadromous and resident native fish:
<b>Marine waters</b>	Fish and wildlife habitat; wind, wave and current attenuation; sediment supply; longshore transport of sediment; and pollution assimilation;	Hydrologic: Transporting and stabilizing sediment, attenuating wave and tidal energy, removing excessive nutrients and toxic compounds; recruitment, redistribution and reduction of woody debris and other organic material.  Habitat for aquatic and shoreline-dependent birds, invertebrates, mammals, amphibians and anadromous and resident native fish.
<b>Primary association areas of critical species.</b>	Fish and wildlife habitat	Habitat functions may include, but are not limited to, space or conditions for reproduction, resting, hiding and migration; and food production and delivery.

<p><b>Buffers</b></p> <p><b>(NOTE: buffers are NOT designated as critical areas)</b></p>	<p><b>Buffers.</b> Habitat for water associated and riparian associated wildlife, wildlife movement corridors, noise and visual screening, large woody debris and other natural organic matter recruitment, floodwater attenuation and storage, temperature maintenance, pollution assimilation, streambank stabilization and supply of sediments and nutrients.</p>	<p>Shoreline vegetation: Maintaining temperature; removing excessive nutrients and toxic compound, sediment removal and stabilization; attenuation of flow, wave or flood energy; and provision of large woody debris and other organic matter.</p> <p>Hyporheic functions: Removing excessive nutrients and toxic compound, water storage, support of vegetation, sediment storage, maintenance of base flows and support of vegetation.</p> <p>[Added: <i>Habitat for aquatic and shoreline-dependent birds, invertebrates, mammals, amphibians and anadromous and resident native fish. Habitat functions may include, but are not limited to, space or conditions for reproduction, resting, hiding and migration; and food production and delivery.</i>]</p>
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#### 4.4.2 Variable Standards for Critical Area Protection

The County's critical area regulations allow some variability in the buffer standards to accommodate unique site characteristics, provide better long term protection for the environment and increase functional performance in degraded or impaired areas. This flexibility also creates incentives for restoration and protects private property rights. Flexibility allows reduction in buffer widths, innovative development and exceptions for single family construction in buffers. WAC 173-26-186(9) allows for reasonable discretion at the local level to balance the various policy goals, one of which is to protect property rights [WAC 173-26-186(5)]. Further, implementation all of the standards in the critical area regulations, including the flexible standards, must ultimately meet the "no net loss" standard in SCC 30.62A.310. Use of these flexible standards is evaluated in critical area studies (with the exception of fencing and separate tracts) and all are tracked by the County's monitoring program.

While the required buffers adjacent to shorelines and wetlands may be varied by using allowed buffer reduction methods, the lowest buffer widths allowed are still within the range recommended by the best available science (BAS) as shown in Figure 18. Figure 18 compares the recommended buffer widths

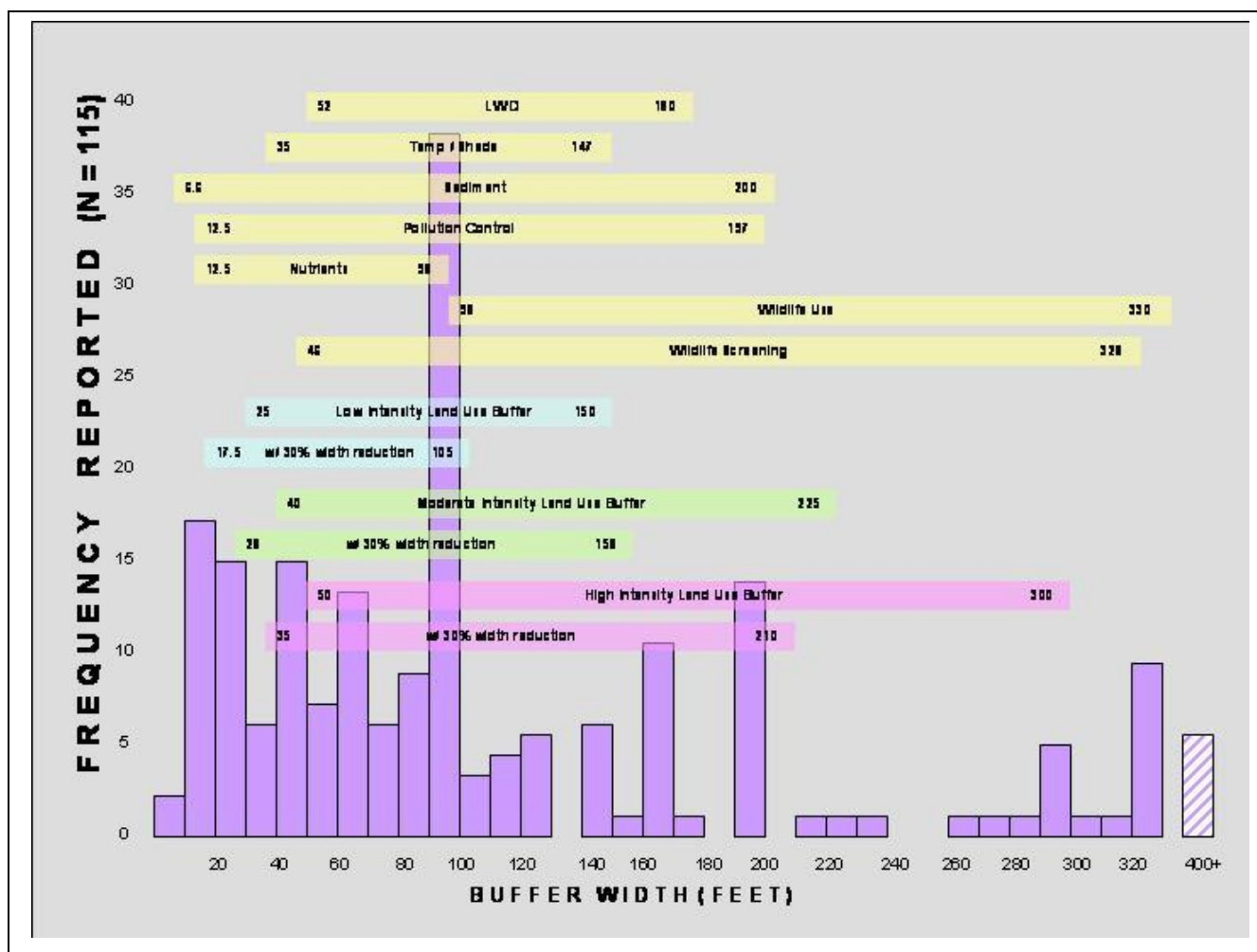


Figure 18. Buffer widths from BAS compared to County-adopted buffers.

in the BAS to the County's adopted buffer standards in the critical area regulations. The purple vertical bars (histogram) in Figure 18 indicate the number of scientific studies reporting effective buffers of the specified width. The yellow horizontal bars show the range of effective buffer widths supported in the scientific literature by ecological function. The blue, green and pink horizontal bars show the buffer widths adopted in Snohomish County's critical area regulations, including the range of buffer widths incorporating the allowed reductions.

### **Buffer reduction methods**

Modest buffer reductions are allowed as an incentive for placing the critical area and buffers in separate tracts and/or for fencing the area to limit access and intrusion have been shown to improve the long term protection of the buffer and the critical area. The County has been implementing this provision since 1996 and has found that the buffers protected by fencing or located on separate tracts are more likely to remain intact than when the buffer is integral to individual lots. When the buffer looks like part of their yard residential owners tend to remove vegetation to extend lawn area, improve views or plant gardens, place accessory structures and dump debris. This buffer reduction method does result in a net loss of shoreline ecological functions because:

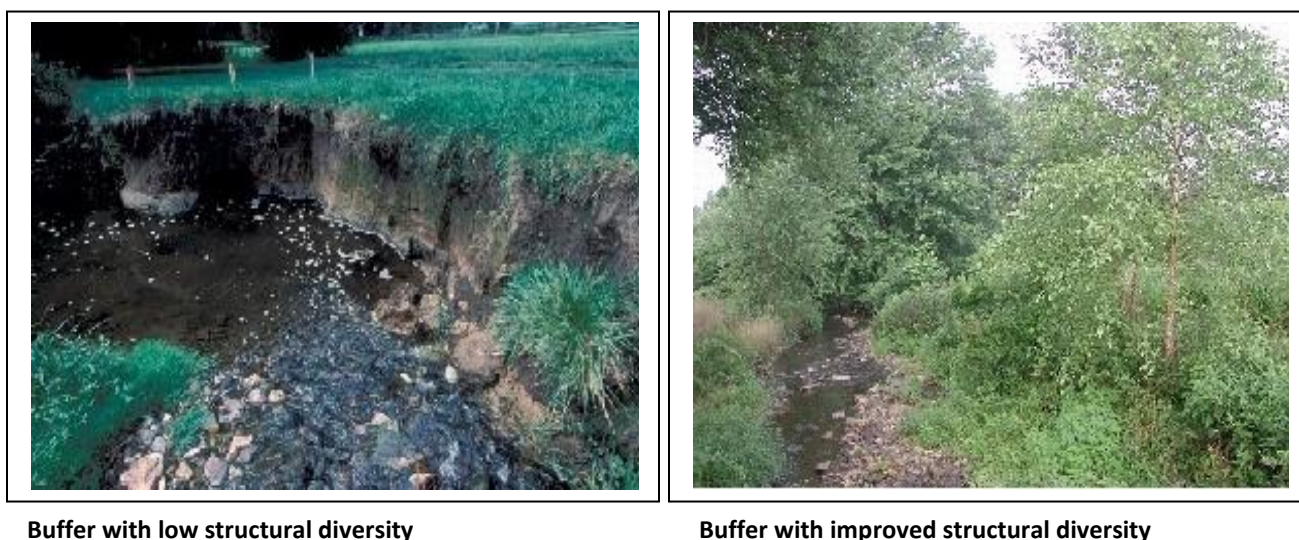
- The buffer provision preserves vegetation more effectively and over longer timeframes by limiting intrusions;
- The functionality attributed to buffer width is balanced with the benefits of reduced encroachment and temporal stability; and
- The buffer provision increases useable portion of property:
  - Property rights benefit
  - Cost offsetting measure

Buffer reductions resulting from buffer averaging or as an incentive for enhancement or restoration must be accompanied by a critical area study assessing the critical area functions before and after the proposed project and documenting that the "no net loss" standard has been met (Pilchuck Audubon and Futurewise v. Snohomish County, CPSGMHB, Case 07-3-0033, Final Decision and Order, April 1, 2008, page 10-11). If the critical area study finds that adverse impacts remain unmitigated, the development proposal must be revised. These buffer provisions will not result in net loss because:

- Buffer averaging does not result in lost buffer area;
- With restoration and enhancement, the functionality attributed to buffer width is balanced with the benefits of restoration of native vegetation, soil improvements and/or increased habitat structural diversity;
- Structural diversity can improve buffer performance over all functions but may be at the expense of effectiveness over one or two individual functions;
- Habitat improvements associated with increased structural diversity; and
- Increases useable portion of property:
  - Property rights benefit
  - Cost offsetting measure

Figure 19 and Table 19 illustrate functional improvements related to increased buffer structural diversity. Functional improvements attributed to structural diversity offset any potential functional decline related to a reduction in buffer width. It should be noted that this buffer reduction method is limited by the regulatory standards. The buffer provision standards allowing reduced buffer width in exchange for buffer restoration/enhancement are designed to minimize and mitigate impacts:

- The required critical area study must document that reduction/enhancement will achieve “no net loss”;
- The extent of the allowed reduction is related to the buffer restoration needs – the maximum reduction is only allowed if the existing buffer functions are non-existent or significantly degraded. Buffers with partial functions prior to restoration are eligible for a lesser width reduction upon restoration/enhancement;
- The total buffer area cannot be reduced below 75% of the standard buffer area required prior to the enhancement reduction.



**Figure 19. Example of Buffer Structural Diversity**

**Table 19. Functional Performance by Buffer Type**

Function	Functional Performance by Buffer Type	
	Reed Canary Grass Buffer	Diverse plant species buffer
<b>Vegetation</b>	Functions attributed to vegetation limited by functions performed by a single species	Structural diversity broadens scope of functions performed by vegetation
<b>Water Movement</b>	Filtration of sediments and pollutants during hyporheic exchange; uptake or excess nutrients; can provide some bank stability	Plant variety improves potential for filtration of sediments and pollutants; uptake or excess nutrients; bank stability
<b>Water Quality</b>	Filtration of sediments and pollutants; uptake or excess nutrients; can provide some bank stability	Filtration of sediments and pollutants; uptake or excess nutrients; bank stability; water temperature reduction (shading)
<b>Habitat</b>	Low to moderate habitat value	Moderate to high habitat value



### **Single-family exceptions for existing small lots**

Within Snohomish County's shoreline jurisdiction are numerous small lots adjacent to rivers and lakes that were platted as single-family residential (SFR) and recreational lots prior to adoption by the state of the Shoreline Management Act or prior to adoption by the County of the updated critical area regulations. Many of these lots are too small to meet the updated critical area buffer requirements – there is no (or very little) developable area outside of the required buffer. To recognize this limitation and retain some development potential, there are flexible provisions in the County's critical areas code for single-family development. These provisions can only be used on these older lots. New lots will not be created that can't meet the critical area buffer standards.

The standards for single-family development in the buffer are designed to minimize impacts:

- Maximum buffer disturbance is limited to 4,000 square feet;
- Effective impervious surface is limited to 10%;
- Expansions and remodels are limited and must not be located closer to the water than the existing structure;
- Buffer disturbance must be the minimum necessary;
- There must be no alternative location outside of the buffer;
- Avoid impacts to critical species;
- Minimum buffer width of 50% of the standard required buffer – on shorelines this means no smaller than 75 feet;
- Minimize disturbance and removal of native vegetation;
- Sewage distribution lines within the buffer must be installed by hand to minimize disturbance of vegetation;
- Fencing to be installed along the upland edge of the remaining buffer;
- Mitigation for buffer encroachment shall include buffer enhancement where such enhancement would be beneficial.

Providing this flexible standard for single-family development when the original plat or subdivision did not anticipate current regulatory standards under the SMA and the critical area regulations allows the County reasonable discretion to balance the SMA goals: single-family as a preferred use in shorelines, protection of private property rights and environmental protection.

There is an estimated 872 vacant lots under one quarter acre in size that may be encumbered by shoreline buffer requirements without developable area outside of the buffer. If each of these lots uses a full 4,000 square foot development exception to build a house the total buffer area lost countywide would be approximately 80 acres. Actual development potential may reduce this 80 acre buffer loss due to any of the following factors:

- Standards for water and sewer provision in rural areas may preclude development on some small lots;
- Development restrictions on steep slopes, channel migration zones and flood hazard areas may preclude development for life, health and safety reasons;
- Not all of the vacant lots will be developed and of those that do develop, some of them may have developable area outside of the buffer and won't utilize the full 4,000 square foot exception.

Impacts from this potential loss in buffer acreage will be minimized on a site-by-site basis as required by the critical area standards. Use of this exception for single-family development will be tracked by the

County's monitoring program. The County's non-regulatory programs, particularly acquisition and restoration programs will offset potential losses due to application of this exception for single-family.

### **Innovative Development Design**

To address the goal of the SMA to promote water-dependent activities and public access to shorelines, the critical area regulations includes a flexible standard to accommodate innovative development designs. While this flexible standard may result in buffers below the range recommended by the best available science this is necessary to fully address all the goals of the SMA. However, even water-dependent uses and the innovative development design standards must meet the "no net loss" standards in both the SMA and the critical area regulations. To utilize the innovative approach, a critical area study must be completed to analyze the ecological functions and establish appropriate mitigation to achieve "no net loss". In addition, use of this provision would require a shoreline variance.

Projects using the innovative development design option are subject to the following standards:

- The innovative design will achieve protection equivalent to the treatment of the functions and values of the critical area(s) which would be obtained by applying the standard prescriptive measures contained in this chapter. Proposals offering better protection would also be acceptable;
- Applicants for innovative designs are encouraged to consider measures prescribed in guidance documents, such as watershed conservation plans or other similar conservation plans, and low impact stormwater management strategies that address wetlands, fish and wildlife habitat conservation area or buffer protection consistent with this section;
- The innovative design will not be materially detrimental to the public health, safety or welfare or injurious to other properties or improvements located outside of the subject property; and
- Applicants for innovative designs are encouraged to consider measures prescribed in the PSAT 2005 Technical Guidance Manual for Low Impact Development and in chapter 30.63C SCC.

In addition, the standards for a shoreline variance must also be met:

- Shoreline variance permits for development or allowed uses pursuant to SCC 30.67.430 located landward of the ordinary high water mark and/or landward of a wetland may be authorized provided the applicant can demonstrate all of the following:
  - That extraordinary circumstances exist on the project site
  - That the strict application of the bulk, dimensional or performance standards set forth in the SMP creates a hardship by precluding, or significantly interfering with, reasonable use of the property;
  - That the hardship described in SCC 30.44.150(2)(b) is specifically related to the property, and is the result of unique conditions such as irregular lot shape, size, or natural features and the application of the SMP, and not, for example, from deed restrictions or the applicant's own actions;
  - That the design of the project is compatible with other authorized uses within the area and with uses planned for the area under the Snohomish County comprehensive plan and SMP and will not cause adverse impacts to the shoreline environment;

- That the variance will not constitute a grant of special privilege not enjoyed by other properties in the area;
- That the variance requested is the minimum necessary to afford relief; and
- That the public interest will suffer no substantial detrimental effect.

Utilizing the innovative development option allows the County to meet the SMA goals to accommodate water dependent uses and provide public access to shorelines all while protecting shoreline ecological functions and upholding the “no net loss” standard. Allowing this flexibility in site design provides the opportunity to:

- Implement a better idea or new technology for environmental protection;
- Accommodate water-dependent uses and public access adjacent to the water;
- Address unique site characteristics;
- Encourage use of LID techniques; and
- Provide property rights benefits

#### **Setbacks from Landslide Hazard Areas**

The critical area regulations require structures to be setback from the top and the toe of steep slopes. These setback requirements are based on slope height and the natural angle of repose. The primary purpose is to protect life, health and safety. Setbacks may only be reduced if a geotechnical study shows that the alternative setback is safe and that there is no alternative location for the structure (SCC 30.62B.340(2)(b)). Within landslide hazard areas, the requirements of SCC 30.62A.320 must also be met:

- Required use of best management practices and all known and available reasonable technology;
- Prevent collection, concentration or discharge of stormwater or groundwater;
- Minimize impervious surfaces and retain natural vegetation;
- Prevent increased risk of property damage, death or injury;
- Prevent increased erosion, slope instability, or landslide potential on adjacent, downstream and down-drift properties;
- Prevent adverse impacts to wetlands, fish and wildlife habitat conservation areas (includes streams, lakes and marine waters) and buffer.

Allowing this flexibility in site design provides the opportunity to:

- Implement engineering solutions or new technology to reduce risk;
- Address unique site characteristics;
- Encourage use of LID techniques; and
- Provide property rights benefits

With the exception of fencing and separate tracts and the exceptions for single-family, use of any of these flexible standards require that a critical area study be completed documenting the existing ecological functions, the potential impacts from the proposed development and the measures proposed to mitigate the impacts and achieve “no net loss”. At a project level, use of these flexible standards is not expected to result in cumulative impacts.

Use of fencing and separate tracts provide benefits that offset any functional losses due to buffer width reduction by reducing buffer disturbance and intrusion and improving long term protection. Standards for single-family development in buffers minimize the impacts to ecological functions and balance the goals of the SMA. Each of these provisions is tracked as part of the County’s monitoring program and if they are identified as inadequate to meet the requirements under the SMA, the standards can be revised.

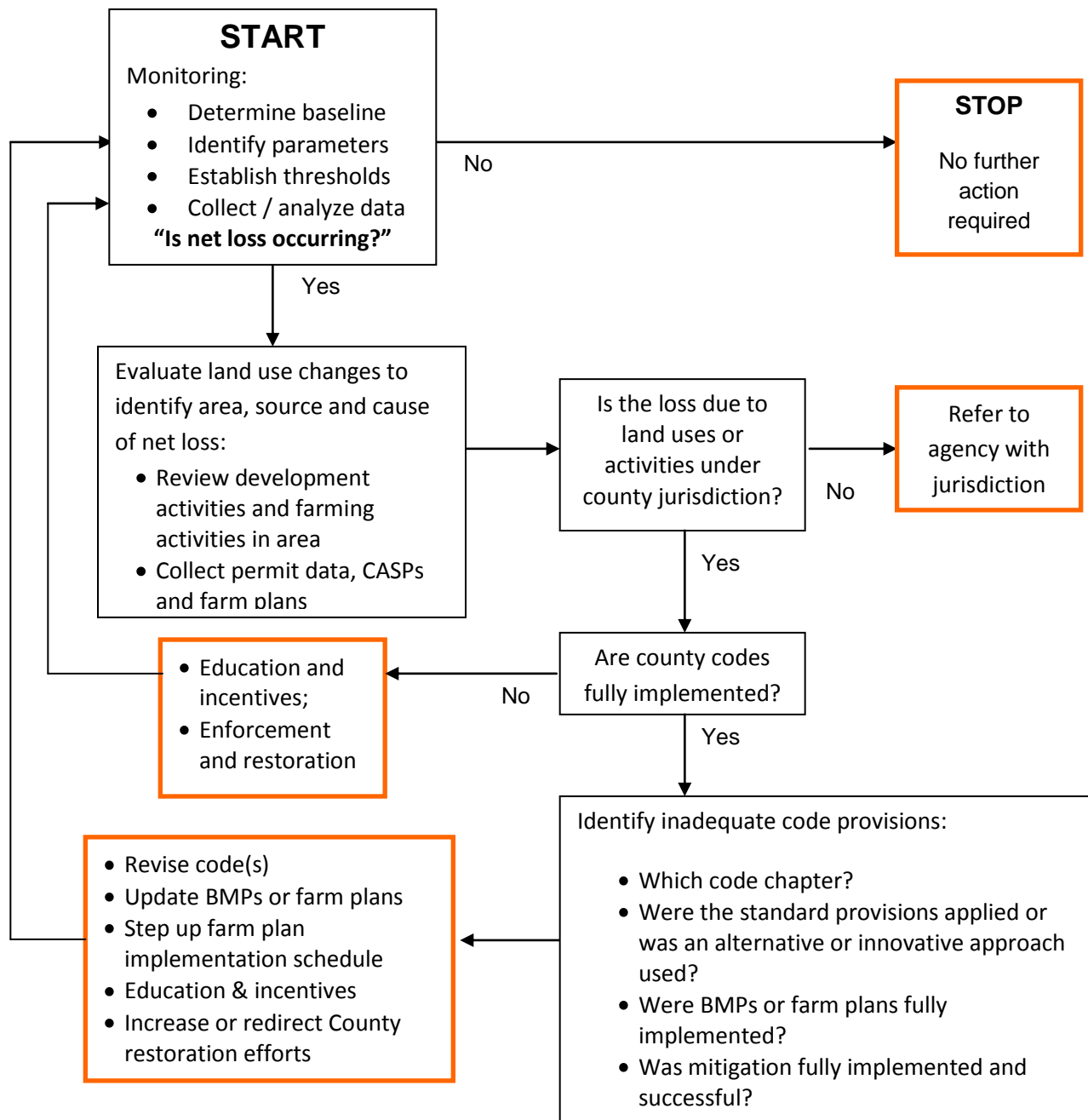
However, the determination of “no net loss” at a County level must include evaluation of the non-regulatory programs as well as the regulatory programs. The County has extensive public education and stewardship programs as well as acquisition, incentive and restoration programs that help to offset any potential failure of the regulatory programs to achieve “no net loss” on their own. The SMA supports water-dependent and single-family development and provision of public access to the shorelines all while requiring protection of shoreline ecological functions. At the same time the shoreline guidelines recognize that the policy goals of the SMA may not be achieved by regulation alone and support implementation of non-regulatory programs to help achieve these broader goals [WAC 173-26-186(4), (5) and (8)(c)].

Variable standards reflect reasonable discretion by meeting one or more of the following criteria:

- Standards are within the range of best available science;
- Standards provide a balance between SMA goals;
- Standards do not unilaterally result in degraded functions but instead result in functional trade-offs – improvement in some functions, reductions in others;
- When combined with monitoring and other non-regulatory programs, the net effect is environmental benefit.

#### **4.4.2 Monitoring for No Net Loss**

To assess the effectiveness of the environmental regulations the County has developed a monitoring and adaptive management plan. Ecological data will be collected and analyzed and an assessment made to see if adverse ecological impacts are occurring as a result of improper implementation or inadequate regulatory standards. Figure 20 shows the decision process the County will utilize in its monitoring and adaptive management plan. If the results indicate that the County’s regulations are inadequate to meet the “no net loss” standard, the County will be able to revise the code. Since critical area ecological functions and shoreline functions are essentially the same, the monitoring program will capture any potential net loss attributable to either regulatory program. Permit activity, including shoreline permits, critical area provisions and shoreline jurisdiction information are all tracked by the County’s permitting system. The situation of “net loss” will be determined and the cause will be identified – Were the regulations complied with and fully implemented? Were the mitigation measures inadequate, or did they fail? Were the regulatory standards inadequate?



**Figure 20. Monitoring and adaptive management decision flow chart**

## 4.5 Conclusion

The CIA indicates that for lake, river/stream, and marine shoreline areas, future growth is likely to be targeted in several specific areas and is likely to impact specific shoreline functions (see Tables 14A, 14B, 14C and 15). This analysis can help inform county officials of potential “hot spots” for future shoreline impacts and will be useful when implementing the requirements of the proposed SMP.

### Lakes

The majority of the future development along lakes will consist of infill in already modified lake shoreline areas, particularly Lake Stickney, Lake Roesiger and Lake Stevens. Future development along lake shorelines, in most cases, is expected to be related to single-family development: houses, accessory structures and private docks, and shoreline modifications including fill and vegetation removal associated with new home construction and new or replacement bulkheads where existing homes may need shoreline stabilization.

- Single-family homes are a preferred shoreline use and will continue to be permitted. New homes and accessory structures will be subject to a 150-foot buffer requirement under the proposed SMP, however, exceptions are allowed for development on existing small lots. The buffer provisions are more restrictive than the 25-foot setback required under the existing program. Regulatory offsets also limit the amount of impervious surface and require that standards be met for drainage and stormwater runoff.
- Docks will continue as a permitted use. Shared or community facilities are encouraged and new docks must adhere to locational, design and materials standards to mitigate for potential impacts to habitat and water quality. Docks cannot be constructed in critical habitat areas and must be of fish friendly design. Construction materials, preservatives and treatments must meet standards for water quality.
- The use of fill is permitted in the Suburban environment under the current program. The proposed program allows fill as well, but requires a conditional use permit for any fill proposed below the OHWM. Fill materials must not impair water quality functions and be the minimum quantity necessary. Fill is not allowed for the sole purpose of extending yard areas.
- New or replacement bulkheads are currently allowed. Under the proposed program, new bulkheads would only be allowed to protect existing primary structures. New and replacement bulkheads would be subject to locational criteria and construction standards. Non-structural bank stabilization methods are preferred such as those described in *Green Shorelines*<sup>2</sup>.
- For residential development, disturbance of natural vegetation should be the minimum necessary.

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<sup>2</sup> City of Seattle, *Green Shorelines: Bulkhead Alternatives For A Healthier Lake Washington*, [www.seattle.gov/dpd/greenshorelines](http://www.seattle.gov/dpd/greenshorelines), undated.

## Rivers

The majority of the future development along rivers and streams will consist of continued agricultural activities, forestry-related uses, and residential development within areas that currently have mixed and moderate-level use. Recreation use along the rivers will likely be limited to public access and passive activities such as picnic areas, hiking trails and water access for small boats and kayaks.

- On-going agricultural activities are not regulated by the SMA and are therefore not subject to the provisions in the proposed SMP. New agricultural activities are largely exempt from shoreline substantial development permits but must comply with other provisions in the SMP. Regulatory offsets focus on identifying resource needs - ecological and agronomical - and implementing best management practices that are sensitive to both. Agricultural activities are expected to continue in the lower river valleys of the Stillaguamish, Snohomish, Snoqualmie and Skykomish Rivers. Other shorelines where agricultural activities are prevalent include the NF and SF Stillaguamish River, Pilchuck River, Armstrong Creek, Carpenter Creek, Church Creek, Dubuque Creek, Pilchuck Creek, Segelson Creek and Woods Creek.
- Forestry and timber management are regulated under the Forest Practices Act (Chapter 76.09 RCW) and are not regulated under the SMA unless the land is being converted to another use besides growing trees or the commercial harvest is within 200 feet of a shoreline of statewide significance and exceeds the harvest limits established in the SMA. Conversions must comply with the provisions in the SMP for the new use. Commercial harvests adjacent to shorelines of statewide significance exceeding 30% of the timber volume in a ten year period are required to obtain a shoreline conditional use permit. Forestry is the predominant use in the upper watersheds and affects many shoreline streams flowing into the NF and SF Stillaguamish and into the Skykomish.
- Residential development typically involves clearing of vegetation, increased impervious surface, and fill and grading. While dock construction is common for lakefront properties, it is not typical or expected along riverfront property. Riverfront residential development often involves bank stabilization and flood protection measures, however, new bank stabilization and flood protection is only allowed under the proposed SMP when needed to protect existing primary structures. New primary structures will need to employ other non-structural measures to achieve the necessary protection. Further, the proposed SMP significantly limits new structures within the channel migration zones and flood hazard areas, and restricts clearing and impervious surface within 150 feet of the water.

Most of the new residential development is forecast to occur in the Rural Conservancy areas along streams in the western half of the County and in Urban shoreline areas within UGAs. The stream corridors with the greatest growth potential include the Sultan River/Marsh Creek area, SF Stillaguamish, SF Skykomish, Canyon Creek, Woods Creek, Pilchuck River/Little Pilchuck Creek area, Swamp Creek, and the Sauk River. Development in areas along the Skykomish and the Sauk Rivers will be subject to restrictions in the channel migration zone.



## **Marine**

The majority of the future development along marine shorelines will consist of continued residential development and some agricultural use within areas that have a range of current development conditions. Agricultural activities will occur along the marine shorelines north of Stanwood and along the Stillaguamish estuary. Residential uses will occur from the Warm Beach area south to Tulalip and along the southwest marine shoreline between Mukilteo and Edmonds. Recreation –related development may occur at Meadowdale Beach, Picnic Point and Kayak Point Parks. Re-development may occur at Point Wells providing opportunities for clean-up and restoration as part of the project proposal.

- Agricultural activities will be regulated as per the Rivers discussion above.
- Residential uses along marine shorelines are subject to unique ecological functions related to wave action, sediment transport, critical saltwater habitat and feeder bluff erosion. Under the proposed SMP, structural bank stabilization is not allowed to protect new primary structures. New structures will have to utilize non-structural options such as setbacks and vegetation to reduce impacts from erosion.

Dock construction is not as common as along lake waterfront and faces more challenges due to tidal action, wave forces and depth in saltwater. Docks may not be located in critical saltwater habitat and must be designed and constructed to minimize impacts on fish habitat, water quality and navigation.

Along marine shorelines with high banks, residential use also can include beach access structures such as stairs and trams. Such structures must be designed and constructed to prevent disrupting the natural functions of feeder bluffs and should minimize disruption to shoreline vegetation.

## **No net loss**

The regulatory component of the proposed SMP includes many provisions designed to avoid, minimize and mitigate impacts to shoreline ecological functions. Shoreline environment designations and management criteria are sensitive to the ecological conditions present. In addition:

- Allowed, conditional and prohibited land uses are sensitive to the shoreline environment and ecological conditions;
- Specific use and modification standards are sensitive to ecological functions and shoreline environment;
- Critical area standards based on best available science for the protection of functions and values; and
- Flexible provisions are subject to performance standards and monitoring.

It is anticipated that the foreseeable future impacts will likely be more than offset by the policies and regulatory protections contained in the proposed SMP, as well as those of other local, state, and federal environmental regulatory and non-regulatory programs. When the regulatory and non-regulatory programs are used together, the outcome is expected to meet the “no net loss” standard for shoreline ecological functions.

## 5.0 CUMULATIVE IMPACT ANALYSIS DATA TABLES

The data tables in this section contain the complete data collected for each reach, a description of the location and geographical extent of the reach and the results of the analysis (i.e., the forecast of potential impacts). The data is organized by reach ID number.

### Explanation of variables in the tables

**Reach ID:** ID number assigned for this analysis.

**Water Type:** River, marine or lake shoreline

**Watershed:** Major river basin based on WRIA plans

**Sub-Basin:** Secondary major river basin

**Water Name:** Local name of waterbody

**Reach Description:** Description of extent of reach. For marine and river shoreline, the description includes a lower and upper extent. Major rivers have more than one reach ID. For lakes, the entire lake shoreline is considered as “the reach”.

**SMP Env. Designation(s):** Proposed shoreline environment; several reaches have more than one assigned environment. Parcel data was collected for each environment within the specific reach.

**Zoning:** Zoning from County zoning maps.

**No. Parcels:** Number of parcels in a given reach by SMP environment designation. If a parcel contains any amount of shoreline area it was included in the analysis. Data from the County assessor records.

**Parcels w/ primary structures:** Parcels with market improvement value of greater than \$0 from County assessor data.

**No. waterfront parcels:** Parcels w/in 100-feet of the Aquatic SMP environment designation or hand selected based on stream location where Aquatic has not been assigned due to map scale.

**w/ primary structures:** Waterfront parcels with market improvement value of greater than \$0.

**w/ armoring:** Waterfront parcels with bulkheads or levees/dikes – from County data. This is an incomplete data set, particularly in relation to lake front properties with bulkheads.

**No. docks:** County data set compiled from 2007 aerial photos.

**Total vacant parcels:** Parcels with market improvement value of \$0 from County assessor data.

**Available for development:** Vacant parcels, excluding lands currently enrolled in open space tax classifications which limits use to agriculture, forestry/timber or open space.

Also excluded are government owned lands and recorded open space/common areas, roads, utility facilities and corridors, parks and trails. Data includes the number of parcels and the parcel acreage.

**Large enough to subdivide:** Vacant lands which are available for development and are at least double the minimum lot size required under the zoning. Includes the number of parcels and the acreage.

**Non-vacant parcels large enough to subdivide:** Only includes lots that are currently developed (market value greater than \$0) but that are large enough to subdivide (at least twice the minimum lot size for the zone category). Includes the number of parcels and the acreage. Excludes lands currently enrolled in open space tax classifications which limits use to agriculture, forestry/timber or open space. Also excluded are government owned lands and recorded open space/common areas, roads, utility facilities and corridors, parks and trails. Land zoned for mining is not generally available for (re)development during the planning period as it will likely be used for mineral-related activities or required buffers. It will be restored or re-developed in the longer term as part of the individual mining operation's reclamation plan. Commercial and industrial zoned lands do not have a minimum lot size requirement. Development potential is assigned 1 to 1. Re-development is also assigned 1 to 1 but only when existing improvements are assessed at \$250,000 or less.

**Zoning factor:** Minimum lot size factor based on the predominant zoning in the reach by shoreline environment designation. This factor is used to calculate new lot potential through subdivision for those developable lots large enough to subdivide.

**Total develop. potential (parcels):**

**Rural areas:** New lot potential is based on the number of vacant parcels available for development, the vacant and non-vacant parcels large enough to subdivide; and the zoning factor based on the minimum allowable lot size. Rural zoning also reflects a 35% development bonus for rural cluster subdivisions. Environmental constraints such as wetlands, steep slopes and channel migration zones are not included in this evaluation thus the numbers reflect an estimate of the *maximum* potential based only on zoning. Environmental constraints and implementation of the SMP regulations will affect the number, placement and design of new development and offset potential ecological impacts.

**Urban areas:** Parcel level data was used from the land capacity analysis compiled for the annual buildable lands report. Environmental constraints are figured into this analysis for urban areas.

**Forecast of Potential Impacts:**

**New primary structures:** Impacts are allocated into shoreline areas based on County urban and rural population growth forecasts and the proportion of the capacity available in shoreline areas. Population forecasts (2007 – 2025) are translated into housing unit forecasts assuming an occupancy rate of

96% and an average household size of 2.9. A portion of the housing forecast is then allocated into shoreline areas based on the proportion of the total capacity available in urban or rural shoreline areas.

**New impervious surface (acres):** 3150 sq. ft of new impervious surface per new structure (converted to acres)

**New vegetation clearing (acres):** 4000 sq. ft. of clearing per new structure (converted to acres)

**Parcels w/ new armoring:** Waterfront parcels w/ existing primary structures that do not currently have armoring or flood control structures multiplied by the urban or rural growth rate for primary structures.

**New docks:** Waterfront parcels that do not currently have docks multiplied by the urban or rural growth rate for new primary structures.



## 6.0 REFERENCES

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